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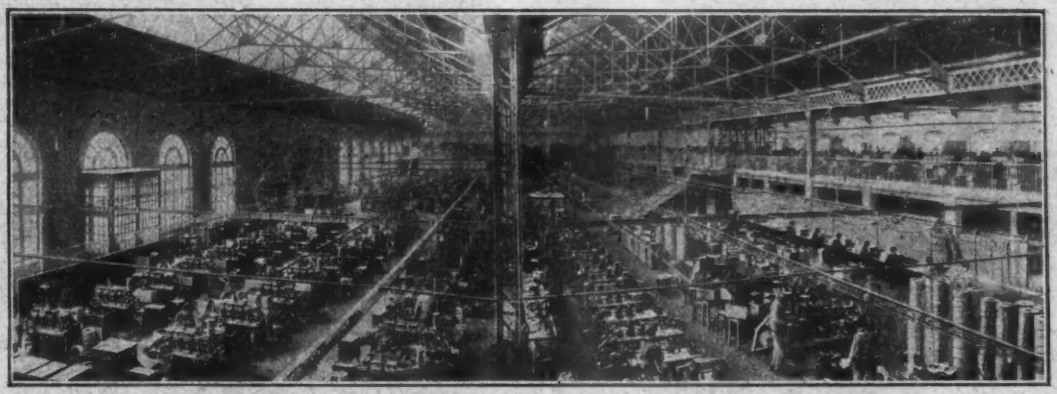

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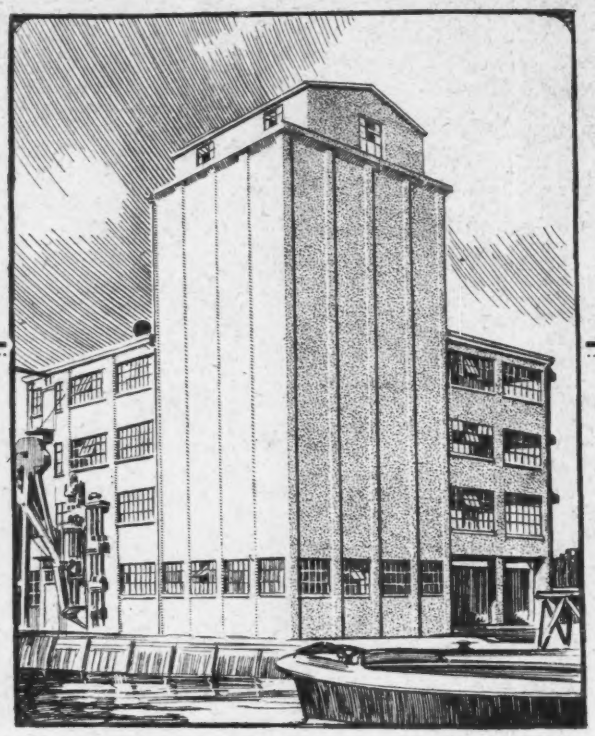

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CONTENTS

	PAGE		PAGE
EDITORIAL COMMENTS	473	CENSUS OF THE COCOA AND SUGAR CONFECTIONERY TRADES	489
THE GENERAL PRINCIPLES OF CHEESEMAKING	477	THE CONFECTIONERS' AND BAKERS' EXHIBITION	491
TIN-PLATE FOR CANS FOR PRESERVED GOODS	481	THE GROCERS' EXHIBITION	491
TRADE NEWS	482	OVERSEAS NEWS	493
SUNSHINE AND PORK	482	COMMERCIAL AND LEGAL NEWS	496
POWER ECONOMY IN THE FOOD FACTORY	483	CURRENT LITERATURE	498
RECIPES	486	RECENT PATENTS	499
SPOILAGE OF PRESERVED MEATS	487		

Ministry of Health's Report.

THE RECENTLY issued ninth annual report of the Ministry of Health contains a number of important references to the inspection and supervision of food. We instance the following. Last year, as a result of representations to the effect that the importation of condensed machine-skimmed milk should be prohibited on hygienic grounds, a Commission was sent to the Netherlands and Denmark to investigate the conditions of production. The Commission reported that the sanitary conditions of production in these two countries were, on the whole, not inferior to those generally existing in England and Wales.

The question of requiring the words "Unfit for Babies" to be displayed more prominently was considered, and regulations amending the Public Health (Condensed Milk) Regulations, 1923, and the Public Health (Dried Milk) Regulations, 1923, were accordingly made in November, 1927.

Coming in the midst of attempts to raise a food-poisoning panic among the public, with the object, one may presume, of stampeding the Government into modifying, or even withdrawing, the Preservatives Regulations, it is interesting to note that, according to the 1927 reports of the public analysts, there is now little cause for complaint. The number of samples reported against was 5·5 per cent. of the total number examined; in 1926 the figure was 5·8, and in 1925, 6·5. This proves that a steady improvement has taken place. Of the 783 contraventions in respect of articles of food, sausages and other meat products accounted for 519. The irregularities reported included the presence of boric acid, salicylic acid, and other prohibited preservatives, the excess of sulphur dioxide or benzoic acid in certain cases, and the omission to label (also faulty labelling) the articles where required.

In the case of the 30 samples of canned vegetables reported against, the irregularity was the presence of a copper colouring matter. Presumably this refers to products from foreign countries, since the harmless green colouring agent discovered by Mr. Hirst, of the Campden Research Station, obviates the use of toxic compounds.

Food Contamination.

It was only after the most careful and thorough investigations had been made by a varied body of experts, and after all possible views and opinions had been deliberately weighed and sifted, that the Government took the final step of embodying the conclusions in the Preservatives Regulations. It is very unlikely that the Government will be much perturbed by an alarmist Press; on the other hand, we think that good will come out of it and that the Ministry will look more closely into the question of contamination of fresh food by handling and transport. Fresh food is obviously more liable to contamination than food which has been canned, bottled, or preserved in some such "natural" way, and,

moreover, greater care is bestowed upon the handling and conveyance of the latter. Then, again, most of the preserved food bears the brand of the manufacturer, whose reputation is more obviously at stake than the unknown producers or packers of fresh food.

We believe that the Ministry should direct more attention to the conditions under which meat, fruit, and milk are produced and distributed. Sir Bruce Bruce-Porter has stated that the recent outbreak of para-typhoid was due to cream from an infected source in Ireland. Clearly, all imported cream should be hermetically sealed in 6 and 12 ounce tins, on which should be stamped the date of production, analysis, and country of origin. The conditions of production at the farms require investigation, especially the supplies of water and the outlets for pig swillings, manure, etc. Mr. A. Ashworth raises the question as to whether the milk churns in Ireland ever get efficiently sterilised; this point is particularly important, since the separated milk is fed to pigs.

Other Views.

The danger in Bruce-Porter's statement is that it may lead to hasty generalisations. This question of preservatives and cream is a really big one and has many sides; it cannot be dismissed in a few dogmatic sentences. There is much that remains to be investigated and a host of facts to be assembled before a sane, common-sense perspective can be obtained. We want the true facts collected and published by an unbiassed body of experts, and the Ministry should set about the task immediately.

We have asked for "true facts." We should like to know, for instance, if the following assertions of J. Graham Sherratt are true facts: (1) Preservative of any description has been prohibited in milk since 1912 in this country, and no reported epidemic of para-typhoid has been traced to milk during recent years. Milk being the source from which cream is derived, it is difficult to understand why the safe use of cream only should be dependent upon the introduction of preservative, as has been suggested frequently during the past few weeks; (2) many preservatives exert a selective action on organisms causing putrefaction, whilst remaining entirely non-toxic to pathogenic varieties, and their use may therefore engender a false feeling of security by giving an illusory "freshness" to cream; (3) the concentration of boron preservative in cream necessary to destroy the para-typhoid organism is at least three times as great as the maximum quantity hitherto allowed, and the total prohibition of its use can therefore have had no bearing whatever upon the incidence of the outbreak.

A correspondent to the Press has observed that the evidence submitted to the Departmental Committee, upon whose recommendations the Regulations were based, has never been published, and that the recent epidemic of para-typhoid has resulted in a fresh demand for a public inquiry into the whole subject.

Refrigerators.

How long will it be before the public realises the value of kitchen refrigerators? The refrigerating industry, with the British Electrical Development Association and the British Commercial Gas Association, have certainly spent large sums of money to announce the availability of a simple and effective means of keeping food fresh, but the truth remains that it has fallen far short of accomplishing its purpose.

In our opinion, very much more educational propaganda will have to be carried out by public bodies and by the Press, and even by the Government, before any material impression can be made. It should penetrate into every school, home, factory, and shop, and it should embrace all the basic and essential facts relating to food spoilage and hygiene.

Lacquers.

The appearance of the first British book dealing with the technical aspect of stoving finishes for tinplate decorators and tin-box manufacturers has been well timed to coincide with the widespread interest that is being aroused in British canning. The author of this excellent booklet is Mr. A. Ll. Matthison, who has been closely connected for over thirty-two years with the manufacture of varnishes, coatings, and lacquers for the tin-box industry. As one would naturally expect, this is a thoroughly practical book written for the plain man in the factory.

It is by the second part of the book that the canner will find his attention first attracted. This section deals with baking lacquers for food containers, and begins with an outline of present-day methods of retorting or sterilising meats, soups, fish and meat pastes, vegetables, fruits and jams, and the precautions to be observed in preparing, lacquering, and stoving the plate. It is pointed out that canners should consider some improved method of side-seam soldering, which, unless carefully done, is liable to scorch and thereby weaken the lacquer inside the tin on the soldering line. Reaming processes are also a cause of weakening or fracturing of the lacquer, and these methods need to be improved.

Some interesting tests are recorded on a new lacquer called "super-zinnatine." It is stated that with double lacquering a range of coloured fruits which are particularly liable to lose colour badly in plain tins were in perfect condition after six months. It was particularly noticeable that the natural deep purple colour of the black currants—both of berry and juice—was perfect, and that no trace of the unnatural blue colour could be discerned. Raspberries

and loganberries retained their natural deep crimson colour, and the syrup was bright and clear in both cases, while Victoria plums retained their delicate shade of pink. This is very satisfactory, and we hope to hear that after a further period of six months' storage the results are equally good.

This useful handbook also gives practical advice relating to the equipment and lay-out of the stoving-room, the application of varnish, the choice of stoves, ovens, and varnishing machines, and it discusses the causes of faulty results, varnishes for special purposes, and seaming compounds and seaming methods. Our congratulations to the author of a really practical little book.

Mayonnaise.

Separation of the emulsion after bottling is often a troublesome factor in the marketing of this product. Strict attention to detail and the use of a suitable homogeniser have given good results in this country. Manufacturers, however, are looking for a stabiliser which will give the desired result when used in quantities of approximately 0·5 per cent. Experiments are being made in order to ascertain if one of the alginates will answer this purpose. Alginates are obtained from seaweed, such as *Laminaria digitata*, which was at one time sold and used as food in Scotland.

Baby Soup.

Yet another departure has been made in the manufacture of prepared baby foods. These have been placed on the market by an enterprising American manufacturer. They are put up in glass containers of such a size as to preclude the probability of having some left over, and it is stated that they have met with the approval of the American mother.

Genuine Maple Flavouring.

A process for the manufacture of a genuine maple flavouring product has been devised by John W. Sale and J. B. Wilson, of the U.S. Department of Agriculture. It has been patented and dedicated to the public and will shortly be on the market.

All previous attempts to manufacture a maple flavour concentrate have depended on the extraction of the flavouring constituents from the sucrose. Sale and Wilson have reversed the procedure, and by precipitating the sucrose with barium hydroxide, leave the flavour behind. After concentration, the product has a strength of 40 to 1 against maple syrup.

There are, of course, many synthetic and compounded flavours on the market.

Cheese in Glass Containers.

The latest development in the packing of cheese emanates from the United States.

The Kraft Cheese Co., of Chicago, having had a large public response to Limburger cheese packed in glass, has adopted this method of marketing for each of their several cheese products. The customer thus actually sees the goods before purchase, and, as the colour of the cheese varies somewhat, attractive display should result. The retailer is thus provided with another selling asset, which is all to the good.

Gelatine.

From the consumer's point of view there are, broadly speaking, only two types of gelatine—suitable and unsuitable. On the other hand, the modern gelatine manufacturer produces many different qualities, and, as a result of many years' specialisation, can, as a rule, meet the users' requirements when he is informed as to the use to which the gelatine is to be put.

Unfortunately, many consumers are reticent on this point, and having paid a high price for a superior quality, selected by themselves, blame the gelatine if the finished product does not come up to their expectations. In many cases a lower priced article with different properties would have given satisfaction.

During the last fourteen years a vast amount of research has been carried out by workers both in this country and abroad.

A large part of this literature is not readily accessible to the gelatine consumer, and it frequently deals with types of gelatine not met with in commerce. This work is, however, distinctly valuable.

Much more research is required on the standardisation of gelatine and its use in conjunction with food products.

If the gelatine manufacturer, the user, and the research worker could get together more the result would be beneficial to all parties.

English Fruit Juices and Syrup.

Why are we importing fruit juices and syrups into this country? The flavour of English fruits is second to none; soft drinks are becoming more popular, and there is a more extended use of artificial flavouring essences. In America, of course, the production of unfermented fruit beverages has become a big industry.

Work done by American investigators on the production of fruit juices is known to readers of this Journal. It is, however, doubtful if many are aware that the Campden Station has conducted a series of tests with the object of finding out if satisfactory juices and syrups can be prepared from home-grown fruit. It seems to us that there is an opportunity for British manufacturers to push these products more than they have done up to now. If there are weighty reasons that militate against any possible extension

of the market, we should like to know what they are. Knowing none which are insuperable, we give the main results arrived at by Appleyard and Hirst at Campden.

Briefly stated, they found that the syrups made from black currants, raspberries, loganberries, and red currants were excellent. The flavour of the raw juices was, on the whole, disappointing; it should, however, be possible to remedy this defect.

Preparation of Juices.

The fully ripe and sorted fruit was crushed between wooden fluted rolls, and then pressed. The cloudy juice was heated to coagulate the proteins, and then filtered, preferably by a filter press, the cloths of which had been coated with baked filter-cel (a keiselguhr product). Sterilisation of the filtered juice was carried out at 170° F. for twenty minutes, and the corks of the bottles were similarly sterilised, otherwise it was found that moulds developed. Apparently, both flavour and colour of the juices are impaired by the sterilising process, but, as we remarked above, additional research would doubtless find a way out of the difficulty.

In the first place, the utilisation of a more acid variety of a particular fruit will to some extent offset the flattening of flavour following sterilisation in glass containers. Also, there are possibilities in Gore's method in which most of the suspended matter in fresh apple juice is quickly removed by the ordinary milk separating machine. The juice is pasteurised by passing it through a steam-jacketed tin coil at 149° to 158° F., then it is run into sterilised and internally paraffined casks.

The Americans have tried various methods, some involving refrigeration and sterilisation in carbon dioxide. It has been found that heating before pressing in the case of blackberries, red currants, and black currants gave larger yields of juice and more colour and flavour than were obtained by cold pressing. Pineapple, lemon, and orange juices usually darken somewhat if heated in presence of dissolved oxygen or if exposed to air during the heat treatment. The retention of the original flavour and colour of strawberry juice is a difficult problem. It has also been found that cold storage at from 32° to 35° F. is a very satisfactory means of controlling colour and flavour changes, and that the distinctive colours and flavours of all fruit juices stored at about 14° F. remained practically unchanged for many months. Pineapple juice requires special methods, but its commercialisation is a very promising proposition, and the same may be said of lemon and orange juices.

Preparation of Syrup.

In the Campden trials, sugar was added to the juice as it ran from the press, or after filtering. The best results were obtained by adding about 7 lbs. of sugar to each gallon of juice (giving a density of 45° to 50° Balling, or a sugar content of 45 to 65 per cent. by volume). The syrup was pasteurised in ten-gallon glass carboys at 170° F., and allowed to stand for several weeks to settle out the proteins. The clear syrup was then carefully syphoned off, filtered through a flannel cone, put into half-pint and pint bottles, and sterilised at 170° F. for twenty minutes.

In this connection we may add that Gore has shown how syrup may be prepared by freezing out the natural fruit water, with no possible loss of delicate flavours; upon dilution with water they are practically identical with the original fruit juice. It is best to stir whilst freezing and then to separate the concentrated juice from the fine ice crystals by a centrifugal sieve.

It appears to us that this method, or some modification of it, is by far the most satisfactory for the preparation of juices and syrup.

Cider Trials.

At the Long Ashton Research Station, experiments have been continued on the fermentation of pasteurised juice by pure yeasts. Ten hogsheads were filled with juice pasteurised at 160° F. and each was then inoculated with a particular culture of pure yeast. A further cask contained the natural, unpasteurised juice to act as a control. All the samples were filtered when the specific gravity had fallen to approximately 1·025. In each case fermentation proceeded slower than in the naturally fermented control.

It is interesting to note that two were judged to be somewhat inferior to the control, but the rest of the samples were preferred to the control by most judges, two especially being considered superior in flavour and character.

We understand that in Germany practically all the important factories employ pure cultures, and special races of yeasts are used to secure special qualities of bouquet, etc., in the finished product; also, that in the German fermentation industries, preparations of the enzyme zymase are being used in place of yeast cultures. As is well known, false yeasts are frequently the cause of undesirable results from fermentation. We are also given to understand that in practical factory work it has not been found advisable to sterilise or even pasteurise the juice, owing to injury of the finer natural flavours. If one sows a sufficient amount of a fresh culture of a strong yeast into the freshly expressed juice, a controlling or dominant fermentation is easily secured and the time of the alcoholic fermentation is reduced one-half.

Another interesting point: the California State Experiment Station have reported very favourably on the use of sulphurous acid in the manufacture of fermented apple juices.

The General Principles of Cheesemaking

By L. J. LORD

This series of articles expounds the general principles underlying the practice of cheesemaking.

PART II

Grinding the Curd before Salting and Filling into the Press Moulds.

The Ripening of Hard-pressed Cheese

A FINISHED cheese, newly out of press, is simply a block of crude "green" curd, solid and compact, but comparatively stodgy, without any flavour, and highly indigestible.

This raw product has to be resolved into a marketable commodity, and, in order to become a palatable and digestible cheese, has to undergo a slow, mild fermentation, lasting in some cases only a few weeks, in others months, by which time its chemical character has undergone extensive change.

In the beginning this change is due to fermentation induced by the organisms present in the milk from which the cheese was made; later, the rennet ferments, hitherto held somewhat in subjection, gather strength, and come into action with far-reaching effect; and, finally, if such is the nature of the cheese—that is, if it has been prepared for such an end—fungus moulds grow and exercise their digestive powers in resolving a hard curd into a comparatively soft and tasty article of food.

To follow with interest and understanding the general course of these changes—though they are yet but imperfectly known—it will be advisable first to review just what components of the cheese form the basis of, and are affected by, them.

Water in Cheese

Actually, cheese consists to a great extent of water, which averages about 37 per cent. of the total weight. There is, however, a considerable range of temperatures, from about 45 per cent. down to 30 per cent., according to the class and age of the cheese. The more water there was in the cheese originally, the greater the probability of a considerable drop later, as the evaporation and consequent shrinkage will be greater than in a cheese with only a moderate amount of original moisture. However, this argument must only

be applied to the hard-pressed cheeses, and not to those of a widely different class, from which the original moisture is drawn under quite dissimilar conditions.

As an instance of its application to the hard-cheese class, and to indicate how necessary it is to bear the fact in mind, the writer, in his search for a record of the kind of English cheese that is put upon the market in a highly moist condition, could find only one analysis of Caerphilly cheese (by Chattanay in *The Analyst*, 1894), recording the percentage of water in the analysis of *one* cheese as 24·80 per cent. This is an authoritative record, but there is not the slightest doubt that it was a cheese well dried out, from a market point of view, before it was sampled for analysis.

As a true indication of the comparison of the loss of moisture, see the following extracted from *Lloyd's Investigations into Cheddar Cheesemaking:*

AMOUNT OF WATER IN CHEDDAR CHEESE IN DIFFERENT STAGES OF RIPENING.

(*Percentage of Water present at Date Given.*)

Cheese made April 22:		Cheese made Sept. 7:	
April 22	39·95	September 16 ..	37·75
July 7	36·55	January 25 (next year)	34·65
August 17	35·45	November 18 („ „)	27·60

NOTE.—The second cheese was fourteen months old at last sampling, and had lost, in water, 10 per cent. of its total weight.

As we shall see later, the presence of water has a considerable influence on the progress of ripening within the cheese.

Albuminous and Proteid Matter

The next component of cheese to consider is the albuminous or proteid matter, which forms the basis of the curd derived from the coagulation of the casein of the milk. It is the substance in cheese that is most extensively affected by the chemical changes brought about during the ripening stages.

The consideration of these changes has been a complicated study for the analytical chemists in their efforts to obtain, not only information as to the new compounds formed, but reliable and trustworthy methods of measuring them at different periods of their development.

They have placed dependence on methods of estimation that indicate the increasing solubility of the curd, and by this means are able to trace and check the progress of ripening by watching for the gradual formation of the following substances—some of them occurring only in minute quantities—as the cheese matures towards final decay:

1. Crude curd (calcium paracasein) insoluble in water or brine.
2. Proteins, or nitrogenous compounds, soluble in warm brine.
3. Several proteins soluble in water and distinguishable from each other by their reacting differently when brought into contact with certain chemical reagents. The last of these compounds to be formed is ammonia.

The amount of these proteid derived substances to be found at any particular time in a cheese is then a measure, not of its age, but of its progress to maturity considered from the chemist's standpoint.

Milk Fat

The third constituent of cheese is the milk fat. This substance is not subject to marked change in the ripening of a cheese. If as the result of analysis from time to time there is a difference in the recorded percentage of fat, it is found to be almost entirely due to the change in proportion of the other constituents.

The amount of fat in its composition has an enormous influence on the physical character of a cheese, enriching it and giving it "quality."

Of high value itself as a nourishing food, fat imparts to cheese a mellowness of body, smoothness of texture, and a certain quality of flavour and palatability not to be acquired in any other way.

Other Constituents

As to the remaining constituents of new cheese, the milk sugar is soon used up in providing food for the ferment organisms, whereas the mineral salts—showing as ash in an analysis—no doubt play an important part in the whole process of cheesemaking and ripening, but once incorporated in the cheese curd are not in any way so evident that they call for notice in studying the after-treatment.

The following table will be interesting as giving a more comprehensive view of the general variation in composition of English cheeses:

PERCENTAGE COMPOSITION OF CERTAIN VARIETIES OF CHEESE.

Variety.	*Water.*	*Fat.*	*Casein, etc.*	*Sugar.*	*Ash.*
Ready for sale, new:					
Cheshire	36·96	29·34	24·08	5·17	4·45
Leicester	32·89	29·28	29·06	4·42	4·35
Wensleydale ...	34·70	31·00	28·10	2·50	3·70
Well matured:					
Cheddar	31·17	33·68	26·31	4·91	3·93
Stilton	32·18	37·36	24·31	2·22	3·93

Moisture and Cheese Conservation

The commercial value of water in cheese depends upon whether it has found itself there by the natural, legitimate methods of manufacture, and is not in undue proportion when the cheese is finished.

Too much water in cheese renders its substance unduly soft, and leads to the formation of cracks and cavities inside the cheese as it dries out.

A highly moist and "sweet" cheese, such as is Caerphilly and some spring-time—*i.e.*, early ripening—forms of other local English varieties, is meant to be consumed as soon as it has developed sufficient flavour to make it tasty. There is no need to keep such a cheese on hand a day longer than is necessary. Only when the cheese has been made from a well-ripened milk will it have a second market value later on, when the blue fungus mould grows in the crevices in the heart of the cheese. This occurs if the ground has been prepared for it in the shape of an acidified curd, controlled in its development to the required degree.

Test for Curdling Point.

At the same time, a high proportion of moisture seems to hasten ripening, but must also result in a shorter period of value at the height of maturity. When there is not enough original moisture in a cheese, owing to methods not properly adjusted to the class of milk used, or to extreme ways of carrying out normal operations, or even when the circumstances of storage cause it to dry out quickly, the cheese becomes mealy and crumbly, the rind hard and thick, and there is a greater waste on the retailer's counter.

Large cheeses retain their moisture best, so that smaller cheeses require correspondingly more care in storage to militate the loss in weight and perhaps "quality" that may ensue.

One very effective means of keeping the moisture in cheese, and protecting it from the growth of moulds on the surface, is that of dipping them in hot paraffin wax, to cover the rind with a thin film. The method has not met with much favour in this country, but is extensively practised in North America and apparently on some of our imports. It is an operation that is carried out at many of the curing depots where these are established, either by cheese buyers or upon a system of co-operation among the cheese factories. Where any quantity of cheese is purchased and stored for use in a later manufacturing process—*i.e.*, "potted," "pasteurised," or "process" kinds of cheese—the saving in weight and preservation of condition is considerable. The only disadvantage to cheese efficiently paraffined appears to be that it will not stand warm storage, for if the store is not protected from hot weather conditions the coating of wax gets soft and may even melt.

To a trade buying large numbers of small-pressed cheeses for later and perhaps irregular delivery, dipping should be a paying proposition, provided there are means of holding in a moderately cool store or cellar.

Factors in Cheese Ripening

The direct causes of the normal ripening of cheese appear to be the following, all working interdependently at the same time or in turn with one another. These are the milk acid, the rennet enzymes, the milk enzyme, and various living ferment organisms, such as bacteria and fungus moulds. Sometimes yeasts take a part in the proper course of ripening, but more often they are responsible for bad flavours or other undesirable effects.

The amount of milk acid present when the cheese comes out of press has a considerable bearing on the character of the changes that follow.

Too little acid results in the cheese acquiring a soapy texture and taste. When this sort of cheese dries out there is likely to be an early development of putridity. If, however, the moisture has been fairly well expelled during the process of manufacture, the cheese has a longer keeping season, but never develops a proper cheese flavour. Any flavour that develops in a "sweet" made cheese is "mild" in proportion to the lack of milk acid in the curd throughout the process of manufacture.

Too much acid gives a hard, dry cheese at a very early stage, unless made too wet, when the cheese either becomes sour to the taste or perhaps acquires a high, strong flavour, especially if cured in a warm atmosphere. Much depends on the subsequent treatment, as some kinds of blue cheese are made from highly acid milk.

The want of acid in a new cheese seriously impedes the formation of the soluble proteins. Actually there is no free acid in the milk or curd at any time. The lactic acid is formed by the milk (lactic) ferments working upon the milk sugar, but it is used up in chemical changes as soon as it is produced. It is the continuous formation of these lactic acid compounds that appears to govern the whole progress of the physical changes apparent in the conversion of milk into cheese. Without acid the rennet will not work half so well, but how far these two factors work together cannot be definitely stated. No doubt they serve to modify each other's work towards a satisfactory end, as if either one is working alone it makes a failure of cheesemaking as we know it.

Both lactic acid and rennet depend upon the lime salts in the milk as necessary to their action in turning it into curd, so that here we can instance a definite service rendered by the "ash" in the process of cheesemaking. The small amount of ash obtained in analysis by burning up the rest of the sample of cheese represents a greater proportion of mineral salts forming part of the substance of highly complex compounds of milk and cheese, and though no doubt of very great importance in the value of these commodities, it is not possible to say just exactly how this importance is manifest.

The rennet enzymes, or structureless digestive ferments found in the extract from the stomach juices of the calf, first play their part in the early stages of coagulating the milk, and then have a com-

paratively quiet time until the acid-forming bacteria have used up all the milk sugar left in the new cheese. The sugar lasts for about two weeks, seldom longer. The presence of the acid salts thus formed provides the right medium for the rennet action to recommence or to become stronger. The proper ripening of the cheese cannot continue without this combination of effort. Here we may say that, other things being equal, the larger the proportion of rennet used in making a cheese the more quickly will it ripen.

The milk enzyme (galactase) is also known to have an important bearing on cheese-ripening activities, but the exact way in which its influence is exerted is as yet little understood.

We come now to consider the organised, or living, ferments concerned. These are mainly the lactic acid species of bacteria, which prepare the way by consuming the milk sugar in forming the acid for which they are responsible. How much farther their work and influence extends cannot be easily stated, but there is no doubt that it is very far-reaching.

Flavour of Cheese

As none of the foregoing agents has been credited with producing the good flavours of cheese, this is still a much-debated and complex problem, though curiously enough, some of the bad flavours of cheese have been traced definitely to certain species of micro organisms.

Flavours may be further derivatives of the protein compounds that are produced towards the approach of maturity. Highly flavoured cheeses owe their strong taste to compounds of ammonia. Offensive flavours in cheese are also formed in the decomposition of cheese fat.

It is considered, but without definite proof, that the flavour of cheeses like Cheddar is due to the activities of some kind of organism or enzyme. With equally good, perhaps not better, reason it is believed that the flavour of blue-veined cheeses is developed by the mould that grows in them, or by some product of the mould inducing a ferment action on the substance of the cheese. In the same way, the flavour of Camembert cheese—not a pressed cheese—is said to depend upon the growth of a certain surface mould, the roots of which are imbedded in the soft coat, and thus inoculate the curd with an enzyme or ferment juice that digests the cheese.

The rate and character of these changes depend in some measure upon the management of cheese in store, a matter for later consideration.

(*Continued from page* 485.)

ciency of the plant low, and the actual cost of generating electricity under these conditions would certainly be higher than the cost of the same power purchased from a central station. The influence of load factor proves conclusively the fallacy of such statements as "this engine is efficient; therefore it will make an efficient source of power." The engine is efficient only at one time—full load, but most of the time it may be operating at light loads and therefore inefficiently.

Future Power Requirements

Another very important factor which favours the system of public supply is the fact that the power user has behind him a large reserve of power to call upon if required. Take the case of a factory with a private generating plant operating the existing machinery where it has been decided to extend operations. A new or larger plant is installed, and the question at once arises as to whether the existing generating plant will be capable of taking the extra load. If it is, then it must have been running very inefficiently in the past or an appreciable amount of capital must have been lying idle in the form of standby plant. If it is not, then additional plant must be laid down, involving further capital expenditure and the occupation of more floor space. Where, however, the supply is taken from the local mains it merely becomes a question of arrangement between the factory and the local supply authorities with regard to the maximum demand rate, and the energy is immediately available.

It must also be admitted that the modern central station, with its high thermal efficiency obtained from modern generating sets of 10,000 kw. and upwards, is in a much better position to generate electrical energy than the small private station. Apart from the aspect of steam consumption, the generation of electricity is a highly technical matter, and the large central power station, with its expert engineers and modern equipment for the control of economical working, is able to secure a high degree of efficiency at a minimum cost. As the demand for electricity increases throughout the country—as it must do—these central stations will improve still further their load factor, and generation costs should fall, bringing down with it the price of the unit to the consumer.

Part Purchase and Part Generation

Before concluding our remarks on the subject of buying power, it may perhaps be as well to point out that there are instances where it may pay to buy part of the power requirements and generate the remainder privately. The conditions governing such a procedure are generally to be determined locally, but, broadly, there is a favourable case for the adoption of this method where the existing boiler plant is only capable of utilisation for part of the power requirements and it is not desired to lay down additional boiler plant for increase steam generation. In such cases a small generating set may be installed to provide sufficient electricity for all the lighting requirements of the factory. The writer recently had the opportunity of inspecting such a plant in a well-known factory in Durham, where power for all the motors was taken from the local supply mains and the lighting requirements for all the buildings was supplied by a small private generating set operated by an engine using its steam from the existing boiler equipment.

Tin-plate for Cans for Preserved Goods

By Dr. HERMANN SERGER
Director of the Brunswick Research Station for the Preserving Industries
(Translated from the German)

Some important results of work carried out at the well-known German Research Station under the direction of Dr. Serger are given below.

PART I

TINNED IRON-PLATE, used almost invariably in the manufacture of cans for preserved goods, is in itself a fairly durable material. It is hardly affected in any way by foodstuffs coming into contact with it —that is to say, such foodstuffs which do not possess the property of directly or indirectly corroding, dissolving, or in any way attacking a tinned surface and the iron underneath the latter. The dissolving of the tin layer may result in an undesirable contamination, or even chemical alteration, of the contents of the can, so as to render the canned goods possibly unfit for human consumption. A partial corrosion of the tinned surface will affect the appearance of the contents and arouse the suspicion of the consumer, especially as the products resulting from the dissolution of the tin settle on the surface of the preserved goods, and in most cases are detectable by the eye. Lastly, tin-plate is rotted and corroded by some materials, which is bound to result in the complete destruction of the goods.

Canned Asparagus

We propose to illustrate the foregoing by a few examples. When a tin of asparagus is opened, it will be noticed in most cases that the inner surface of the can is more or less dark in colour, and not uniformly so, as the colouring is distributed so as to form peculiar patterns, somewhat resembling flowers or fans. This darkening is to be explained as follows: Asparagus contains sulphur compounds which, in the process of sterilisation, give rise to oxidation with a partial conversion of the tin layer into sulphide. However, oxide of tin and sulphide of tin are white in colour. The tin layer, on the other hand, contains lead also, the maximum legal amount being 1 per cent., and sulphide of lead is black. The darkening of the tin-plate used for preserved asparagus will, therefore, vary, more or less, in accordance with the percentage of the lead content.

But tin-plate with an absolutely pure tinned surface will also sometimes show this darkening. This is the explanation: Owing to the tin layer coming into contact with the canned goods it is partially converted into black stannous oxide (SnO) and then into stannous sulphide.

Lastly, a certain quantity of iron, which, owing to a slight porosity existing in all white-iron plate, is partially in contact with the surface of the tin layer, plays a certain part in the reactions.

The fact that the discolouring is never uniform, but assumes fan or flower-shaped patterns, is due to the crystalline structure of the tinning. This darkening of the tinned surface is not only noticed with asparagus, but is also observable from time to time, though to a more limited degree, in association with peas, beans, and other tinned vegetables.

Perforations

In the case of canned fruit and vegetables so-called "perforations" occur. These are tiny holes which look as if they had been punched into the tin-plate, and often give the impression of being due to a defect in the manufacturing of the plate. Preserved spinach, in which this perforation of the plate is typical, disclosed the following on examination: The goods were coppered by the addition of pulverised sulphate of copper, and, therefore, not by a solution of the same. The spinach mass had only partially dissolved the particles of the sulphate of copper, whilst some of the larger particles had been left undissolved. These were in direct contact with the plate used for the can, and, at this spot, owing to the joint action of the liquid in the can, a concentrated solution of sulphate of copper was formed, and the particles had eaten into and through the plate; scientifically expressed, this is an electrolytic process.

Canned Sausage

Remarkable chemical alterations in the inner surface of the can may sometimes be observed in the case of boiled sausages in tins. The places affected can be quite distinctly seen running from top to bottom where the sausages came into contact with the wall of the tin. The darkest portions of these spots are *absolutely rust;* those portions which are not so dark present a dull greyish appearance, and the light portions form a white layer. The water added to the sausage tin was salt water. The skins are prepared by being placed in salt water to which a little saltpetre (nitrate of potash) is added, and the finished sausages are slightly smoked.

Experiments disclosed the fact that the tin-plate was in no way affected when the skins were prepared in salt water only, and without the sausages being smoked. When the skin had been prepared with salt and saltpetre, without smoking the sausages, the influence was only slight, the same remark applying when the skins had been prepared with salt only and the sausages had been slightly smoked. When, however, the skins were prepared with both salt water and

saltpetre, and if, moreover, the sausages were smoked, the action proved strongest. The corrosion of the plate probably first occurs through the oxidising action of saltpetre and smoked products upon the plate, white oxide of tin being formed. This also partly settles on the sausages and spoils their appearance. That the saltpetre is the main cause of this attacking of the plate is shown by the fact that smoked goods, such as sprats, firmly packed in bright tins, disclose no action on the metal of the tin. Of course, in this case, there is no water, which considerably facilitates the corrosion—that is to say, the chemical conversion.

Lacquer Tests

In order to prevent the plate of the tin being attacked by acid material, the plates to be worked up for the tins are lacquered—that is to say, they are coated with a suitable varnish which is burnt into them. A good varnish, properly burnt in, serves its purpose in the majority of cases. Sometimes, however, cases occur where, for some reason which is not very obvious, even the best lacquer does not prove sufficiently durable. In the case of some kinds of cherries, and also greengages, a remarkable fact is often noticeable. The coat of varnish presents a mottled appearance which has been brought about by numerous small blisters. These blisters can be easily broken, and when the tin is shaken they float away. The consequence is that the plate is exposed at these points and becomes eaten through in the form of holes of the size of a needle point. If then, through such openings, some of the liquid runs down the can, a corrosive action actually takes place on the plate. This phenomenon is very remarkable owing to the fact that the liquid in the tin has never proved to be of an excessively acid nature in any case where an examination was made. Many experimental liquids of a much more acid nature did not have this influence on the varnishing.

On examination of the fruits in question, and also, of the sugar solution, it was shown that, as compared with other fruits, there was a higher content in sulphur compounds. The question has not yet been investigated as to whether these sulphur compounds are to be regarded as natural constituents of the fruits or whether they only occur in the case of ripe or over-ripe fruit.

Related to this type of corrosion is the intensive action of stewed rhubarb upon the metal, even upon varnished metal. As the result of this action the lacquer largely disappeared, and also the tinned surface at these places was completely dissolved, so that the iron-plate was exposed. In this process the stewed fruit had absorbed 241 milligrammes of tin per 1,000 grammes of the preserved mass. Other experiments of a similar kind disclosed 155 to 1,135 mg. of tin per 1,000 gm. of preserved mass. Even though tin is a comparatively harmless metal, nevertheless, such quantities when absorbed into the human system may have very undesirable effects on the health. Rhubarb, therefore, should not be preserved in metal cans. The cause of this intensive action is the existence of a certain quantity of oxalate in the rhubarb. This acid first destroys the lacquer at spots where it can be easily attacked, as, for example, along the side seam, and, together with other acids in the preserve, has a solvent action upon the tinning.

When once contact has taken place between iron, tin, and varnish, this combination acts like a galvanic cell, in which the varnish plays the rôle of a depolariser. Owing to these electrolytic processes, the destruction takes place much more rapidly than before. The assertion of some members of the trade that varnishing very often does more harm than good is, therefore, not without foundation.

The examples afforded by practical conditions indicate the factors to be taken into account in connection with the plate used, and the materials preserved in order to obviate deterioration of the preserves or even their entire destruction.

(To be continued.)

Trade News

Sunshine and Pork

"In the swine feeding tests at the Iowa Experiment Station one of the important observations made was the effect of sunlight on nutrition. Those pigs that were fed out in the open so that they got plenty of sunlight made about the same daily gain as the ones fed inside. But they did it more economically and on less feed.

"The pigs fed inside required an average of 425 pounds of feed for each hundred pounds gain to reach a weight of 225 pounds, while those fed out in the sunlight reached the same weight with only 391 pounds of feed for each hundred pounds increased weight. The outside fed pigs made $1·02 more per head over and above feed costs than did those fed inside.

Sunshine Helps

"Mr. Evvard, who was in charge of the experiments, thinks that sunshine was responsible for the difference. He is convinced of this because of the fact that the outside fed pigs did not do nearly so well during the early part of the feeding season when the days were short and cold. On the other hand, after the days became longer and more mild, there was a marked improvement in their gains."—*Live Stock Markets.*

Change of Address

Messrs. Alfred Hughes and Sons, Ltd., the biscuit and cake manufacturers, whose former address was 33, Dale Road, Birmingham, have their offices and factory now at Bordesley Green Road, Birmingham.

The 1929 Exhibition

We are advised that the Confectioners' and Bakers' Exhibition will be held at the Royal Agricultural Hall, London, from September 7 to 13. We understand that about 75 per cent. of the space in this Exhibition has already been taken.

Power Economy in the Food Factory

By "KILOWATT"

PART II

Buying Electric Power

HAVING OUTLINED the case for private generation of electric power in the food factory, and having treated briefly the items involved under capital and maintenance charges, we will now turn to the alternative solution of this power problem—*i.e.*, the purchase of a supply of electricity from the local electricity undertaking.

As in the case of private generation, the factory owner will naturally give first consideration to relative cost with a view to ascertaining whether it is cheaper so to purchase his supply of power. Although this question must certainly have some bearing upon the ultimate decision, it should not be allowed entirely to influence the power user, as there are many other factors to be considered in arriving at a proper solution, some of these factors being economic, some strictly financial, and some engineering. There are, of course, instances where one is compelled to disregard such factors as the credit condition and borrowing capacity of the management, and the need and value to them of money for extending the production end of the business may well determine a solution of the problem quite contrary to that which would be arrived at, under other circumstances, by a careful study of total operating costs under the two systems. Again, managements will often postpone action until power difficulties become really acute, forcing a decision before opportunity has been given for a proper investigation and analysis. Moreover, the difficulties and cost of investigations are

Dough Mixer in a large London Bakery operated by Electric Motor through Chain Drive to Line Shafting. Note Motor mounted on Iron Pedestal.

Electrically driven Automatic Weighing Machines in a London Food Factory. Note Motor mounted on Wall Bracket.

often greatly increased by the absence of true operating records, rendering it necessary to conduct elaborate and expensive tests in order to obtain the required information. In cases such as these, advice on the subject is superfluous, and one can only emphasise the necessity for due care in the running and maintenance of the plant.

Obtaining a True Comparison of Cost

In dealing with the question of relative costs, this can only be determined by an accurate knowledge of the cost at which current could be generated at the factory with a plant suitably equipped to meet the combined requirements of power and heat. This requires a careful study of the particular existing conditions, with due account taken of by-product power which might be produced as a result of utilising exhaust steam at various pressures for process work.

With this knowledge the power user will better be able to judge what rates he can afford to pay for purchased power, but it must be borne in mind that the cost of the unit of electricity purchased embraces not only the cost of coal, but wages, stores, repairs, and standing charges, and to make a true comparison, the cost of these items must be included in arriving at the cost of private generation.

Reserve Capacity of Plant

In a private plant, operating in an industry like that of food production, where continuity of service is of prime importance, ample reserve capacity must not only be provided in the plant, but it must be ready for instant service. Such plants must necessarily sacrifice some measure of efficiency to reliability of service. At least one reserve unit should be provided to allow for proper maintenance and the keeping under steam of only one boiler in a plant, and the operation of this boiler at high ratings is a risky procedure and one not to be recommended where continuity of service is essential. This question of reserve plant and reliability of supply is one in favour of purchased energy, because the supply authority always carries the necessary spare plant to bring into operation in case of emergency, and even in the event of a breakdown it is more likely to be a matter of hours than days, or perhaps weeks, in the case of a private plant before the public supply is resumed. Again, the public supply station usually carries large stocks of fuel, which enables it to maintain supplies in the event of transport difficulties and coal stoppages. This point deserves emphasising in view of the almost unrestricted supplies which were available from all the public sources during the recent trouble in the mining industry. Thus the provision of a re-

liable supply of power may reasonably be claimed as one of the advantages of taking energy from the public mains.

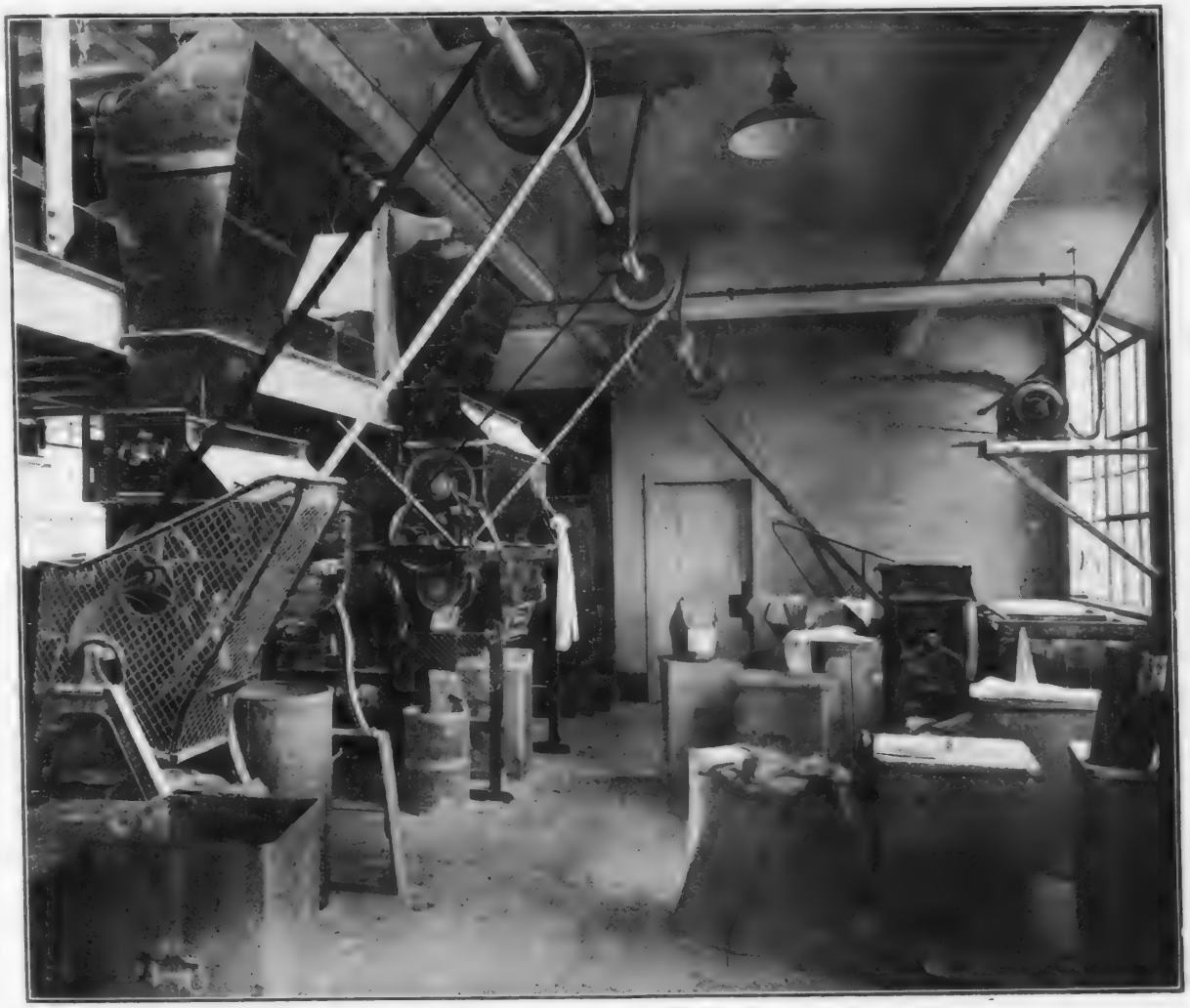
Paying for the Privilege

It may happen that after carefully comparing the cost of private generation against public supply the balance is shown to be in favour of the former system, but this does not necessarily mean that a private plant should be installed. The power user may find it is a wise policy to pay a premium for the privilege of eliminating the necessity of generating energy on his own premises. In the first place, he is relieved of all capital expenditure and a proportion of working and maintenance costs, and, in the second place, he is assured of a continuous supply of power, the cost of which is far more likely to fall than rise. Furthermore, he can operate a section of his plant, if desired, just as efficiently and yet cheaper than the whole factory, whereas if he had a private generating plant and required a certain portion of the machines to run for a certain period, he would still have to run the whole generating plant. This question of running part of the plant light brings us to the problem of load factor.

The Load Factor Problem

In examining the cost of operating a private power plant, one of the most important considerations is the load factor at which it will operate, since this determines to a large extent the capital investment required and the operating efficiency of the power plant after installation. Supposing the average daily load factor of the factory was 100 h.p., the maximum load would probably run up to 130 h.p., and this is the least that must be provided for. Incidentally, these figures are only given to enable the reader to work out his own calculations from them. A cautious power user arranging for a maximum load of 130 h.p. would probably allow for future requirements and instal a plant of 150 or more horse-power. On such a plant, with an average daily load of 100 h.p., the running costs would be high and the operating effi-

(*Continued on page* 480.)



Electrically operated Machinery in the Blending Room of a Food Factory.

Recipes

A Thick Sauce Suitable for all Occasions

3 lbs. liver.
2½ lbs. sultanas.
3½ lbs. tamarinds

are boiled together in water until a thick pulp is obtained. This is then forced through a sieve and introduced into a steam pan. The following ingredients are then added:

1 gill Tarragon vinegar.
2 gals. soy.
2 gals. lemon pulp.
1 gal. orange pulp.
1¼ gals. walnut ketchup.
2¼ gals. mushroom ketchup.
11½ gals. No. 20 vinegar.
7 gals. (wet) gum tragacinth.

(This is made by taking 7⅜ lbs. of ground gum and allowing it to soak in 9 gallons of No. 20 vinegar, with frequent stirring.)

73 lbs. Demerara sugar.
1¾ lbs. salt.
7 x 5 kilo. tins tomato purée.
9 gals. white wine vinegar.
6 ozs. ground black pepper.
6 ozs. ground white pepper.
1⅛ lbs. ginger (ground).
¾ lb. mixed spice.
6¼ ozs. Cayenne.
1 oz. bay leaves.
6 ozs. ground coriander.
1 oz. garlic powder.
6 ozs. ground nutmegs.
3 ozs. ground cloves.
1 lb. lemon peel.
12 ozs. treacle.
12½ gals. tomato sauce.
1½ lbs. ground celery seed.
2½ ozs. salicylic acid.

The mixture is then boiled for 15 minutes, allowed to stand for one hour, and finally strained through a hair sieve.

Sauce for Beef and Poultry

(*From a German Cookery Book.*)

To some brown gravy add a glass of white wine, and flavour it with lemon juice or French vinegar. Put in half a teaspoonful of finely chopped tarragon and cook for several minutes. This makes an excellent sauce for beef or poultry.

A High-class Worcester Sauce

23 lbs. tamarinds (boiled with water and strained through a sieve).
2 gals. garlic in vinegar.
1 gal. shallots in vinegar.
6 lbs. anchovies and 3 lbs. salt.
6 gals. soy.
6 gals. ketchup.
2½ gals. chillies (in vinegar for a night).
10 ozs. ground clover.
2 ozs. nutmeg.
8 ozs. pumento.
1 oz. salicylic acid.
26 gals. No. 20 brown vinegar.
2 gals. lemon juice.
½ bowl gum.
Colouring.
12 lbs. sugar.

Yield, about 48 gallons.

Boil for 15 minutes, allow to stand one hour, and strain through hair sieve.

Pickled Plums

5 to 6 lbs. of Schwitzer plums, or, failing these, any kind of good, small, red plums.
1½ pints vinegar.
1 to 1½ lbs. sugar.
½ oz. whole cloves.
½ oz. whole cinnamon.

Boil the sugar, vinegar, and spices together. Put the plums, which have been wiped and stalked, into the mixture. Cook them for a few minutes, until the skins just burst. Remove the plums to jars or glasses, let the vinegar mixture boil for a short time and pour it over the cooled plums. Tie up in usual way. The plums thus preserved will keep for a year.

"Slab Milk"

A Danish inventor has a special process whereby he claims to preserve milk in the form of slabs (Blättern). A factory for the manufacture of this product is to be erected shortly in Denmark. The inventor states that all the water is extracted from the milk, and that the dry residue, compressed into the form of slabs, will keep for years. By addition of warm water, the dried milk can be used immediately as "fresh milk." Hitherto preserved milk has appeared on the market only in the form of condensed milk or milk powder. The new Danish process would, consequently, be an addition to this branch of the trade.

Spoilage of Preserved Meats

By E. W. LEWIS, M.A., PH.D.

The author discusses the parts played by bacteria, moulds, enzymes, and oxidation in the spoilage of canned meats. Important information is also given regarding the corrosion of tin-plate. The aim of manufacturers should be to obtain their raw material as fresh as possible, to can rapidly under optimum temperature and hygienic conditions, to use high quality tin-plate, and to employ efficient closing methods in order to ensure a lasting vacuum in the tins.

PART II

IT SELDOM happens that canned meats suffer spoilage by yeasts and moulds, except when bacterial decomposition is already well advanced. Vacuum canning and good heat treatment are valuable procedure in the prevention of yeast and mould growths in canned foods. There is evidence that yeasts are plentiful in canned foods such as fruits, but they are seldom found in canned meat products. Experience has shown that moulds do not decompose canned meat products to any extent, although they may give the food an unpleasant flavour, which renders it unmarketable. Moulds do indicate the access of air, and are consequently able to render canned food products unsound.

Savage considers that the condition of becoming unsound depends on (1) the extent of bacterial content; (2) the type of bacteria; (3) efficiency of the "processing" carried out; (4) access of air to the tins; and (5) temperature environment of the tinned products.

Another type of spoilage quite distinct from mould is "must"; this exhibits no signs of fungoid growth, and is difficult to remove. Its cause is obscure; there is little evidence beyond a slimy dampness on the meat product when opened and a disagreeable odour. This phenomenon has been known to occur at low temperatures, even at 5° C., and is said to be associated with *cladesporeum herbarum*.

Enzymes

Spoilage due to enzymes, or active catalytic substances, is of very limited extent, as all enzymes are destroyed at a temperature of 160° F., but they possess one peculiarity—that is, they may remain dormant for a considerable time and then, when the required conditions are re-established, enzymatic activity again asserts itself and proceeds with renewed vigour. Enzymes may mature or deteriorate foods according as the changes which they bring about improve or diminish the quality of the food.

Meat foods consist of very complex systems, and the chemical changes accompanying "spoilage" due to autolysis are essentially the formation of simple or more complex compounds, and in order to sterilise them it is necessary to avoid the use of methods or reagents that may bring about such changes. The development of ammonia and of amine nitrogen is practically the only change that can be studied under desirable conditions; probably the explanation is that bacterical growth is comparatively rapid at "blood" temperatures and slow at low temperatures, but autolysis proceeds under both conditions, and at the lower temperatures renders the food unfit for human consumption before bacterial growth has advanced.

The increase in the ammonia content, which is a common factor in all these actions, may be of value in determining when the meat becomes unpalatable or unsuitable for use, by estimating the amount of this constituent present.

Oxidation

Regarding the spoilage of meat products due to chemical activity, one of the most important is the change brought about by the oxygen of the atmosphere; under favourable conditions, the fat of the meat combines with the oxygen, forming undesirable food products and promoting rancidity. The "ranking" of meat products is said to be due to oxidation, in the same sense that butter rancidity and cheese "flavouring" appears to be due to the combined agencies of oxygen and enzymes. Experience has shown that canned meat products containing an excessive amount of fat are more subject to spoilage due to oxidation influences than those containing low percentages of fat. As the presence of oxygen appears to be essential to the existence of the state of decomposition, many meat canning processes are based on the exclusion of air from the finished canned product. Tellier, the pioneer of food refrigeration processes, carried out extensive experiments in which meat products before canning were subjected to a vacuum process in order to remove all oxygen from the tissue. To exclude oxygen has long been considered an important precaution in order to minimise the tendency to perforation, because of the well-known corrosive action of oxygen on tin-plate.

There is one interesting point which has recently received considerable attention by the American Meat Preserving Association, viz., that all bacterial activity may possibly be arrested in meat products freed from water. Attempts are being made to utilise this property by producing a dehydrated meat. Dr. Falk, of the Harriman Research Laboratories, New York, has patented several processes for canning dehydrated meat products; they have been manufactured, and several lots have been shipped to different parts of the world with successful results. The Falk process (U.S.A. Patent No. 1309357 [1918]) consists of heating the meat product at 60° C. under reduced pressure (about two inches of mercury) until the

oxygen and the moisture have been removed. The apparatus proposed by Fook (U.S.A. Patent No. 1366788 [1921]) consists of a fluid-tight, pressure-resisting vessel containing a fixed gas and liquid. The temperature of the vessel is maintained above the boiling point of the liquid at normal pressure, but below the boiling point at the pressure used. The canned meat products to be treated are inserted, treated, and removed whilst simultaneously maintaining the required pressure and temperature. A serious objection to dried meat products from the edible standpoint appears to be loss of flavour, and they often become tough and indigestible.

The spoilage of meat products due to the action of the actinic rays of light is of limited character and only takes place after long exposure in glass vessels to strong sunlight. Regarding changes which take place during changes in temperature, bacteria and enzymes can function only within definite temperature ranges; on the other hand, chemical changes generally increase with increase in temperature. Canned meat products which have suffered the effects of low temperature in refrigeration stores for a comparatively long period of time appear to change in flavour. No adequate scientific explanation can be offered for this phenomenon, except that it may be due to reactivated enzymes. Considerable research work is now in progress in America on this aspect of the meat canning industry.

Tin-plate

Canned meat spoilage is occasionally due to the metallic containers; there is the possibility of the contents dissolving some of the metallic substances or coatings. The high price of tin has meant that the coating on the tin-plate is remarkably thin, and considerable vigilance on the part of the canners is required to ensure that the tins are free from pin holes or tin perforations. Recently, some of the American canners have experimented with the lacquering of the inside of the containers, with the object of preventing spoilage by metallic contamination. The ultimate influence of the composition of some of these lacquers on the flavour and composition of the meat products is yet to be discovered. It is well known that even the slightest exposure of meat products to an iron surface is apt to discolour the product, and that all canned goods have, to some extent, some chemical action on the surface of the metallic containers. During recent years the thickness of the coating of tin on tin-plates used for the manufacture of containers has diminished considerably; this coating is now in the vicinity of 0·1 grams per square cm. Spoilage due to faulty tin-plate is caused by local porosity in the plate due to the presence of particles of slag, dirt, etc., accidentally introduced into the surface of the iron before or during the rolling process. These parts absorb acid during the pickling operation, and bubbles result when the sheet is tinned, which ultimately form porous spots on the plate.

Exposed iron may also be due to incomplete removal of the oxide scale from the sheet during the pickling operations, with the result that tin is not deposited on these places.

Buchanan examined a number of canned meat products of over eight years old; the highest tin content found was two grains per lb. Although a meat extract contained five grains per lb., the author considered the source of the tin to be due to defective soldering. The tin is generally present in an insoluble form. Apparently the organic acids present in the foods dissolve tin from the containers to a variable extent, and the tin compounds are subsequently hydrolysed in contact with the food, with separation of the tin in an insoluble form and liberation of acid. The hydrolysis is greatest with non-acid products, but in many cases a considerable proportion of the tin salts are carried within the solid particles of the food before being hydrolysed.

Savage is of opinion that whilst great stress must be laid on efficient sterilisation, leaks as means of introducing outside infection are of equal importance, as they introduce oxygen, which lights up and sets into activity already existing but dormant bacilli. Savage (*Food Invest. Bd. Report*, No. 11) states that 60 per cent. of a number of food products he examined were unsterile but quite edible, and that the comparative insterility of sound samples is almost entirely due to the presence of sporing acrobic bacilli, thermo philic sporing bacilli, and micro cocci. The presence of sporing bacilli does not throw any suspicion upon the wholesomeness of the food product.

The importance of the findings of Savage is not that they indicate any danger to health but that: (*a*) they show that sterility is not in itself a reliable test of soundness and that samples cannot be justifiably condemned merely because they are not sterile; (*b*) unsoundness of canned foods is not solely due to outside contamination, but foods may become decomposed and unmarketable not because of outside bacteria gaining access but because the conditions within the container have become changed (by access of sterile air) in such a way as to enable bacteria already present to multiply and decompose the food.

Storage

A method for detection of incipient spoilage has been worked out, based on the increase in volatile acids during the distillation of dilate acidified "iron serum." Likewise the increase in volatile bases in the distillation from dilute alkaline "iron serum" serves the same purpose. A positive isonitile reaction is another indication of incipient spoilage.

Canned meat products are too often regarded by the public as being non-perishable products; conditions of storage are neglected, and this leads to corrosion and, finally, to perforation of the containers. All canned goods should be stored in a dry place of even temperature and good air circulation.

Conclusion

We may conclude by stating that canned meat products, hygienically prepared from a good quality raw material, heat sterilised, and stored in hermetically sealed vessels, are proof against all spoilage for a reasonable length of time. The processes used are positive and subject to almost scientific precision in application. In general, micro-organisms in canned

(*Continued on page* 490.)

Census of Cocoa and Sugar Confectionery Trades

The following particulars, extracted from the "Board of Trade Journal," are given by the Third Census of Production (1924), Preliminary Reports, No. 27.

IN THE following statement particulars are furnished of the output in the year 1924 of firms in Great Britain whose returns were made on the Schedule for the Cocoa and Sugar Confectionery Trades:

Products, 1924.	*Quantity.*	*Selling Value.*
	Cwts.	£
Cocoa Manufacture:—		
Cocoa or Chocolate, Manufactured (except Chocolate Confectionery) ..	984,900	7,793,000
Chocolate Confectionery	1,467,200	12,559,000
Cocoa Husks and Shells	92,200	22,000
Cocoa Butter	77,600	487,000
Sugar Confectionery (except Chocolate Confectionery)	3,662,600	16,691,000
Cocoa Products and Sugar Confectionery, not separately distinguished	—	309,000
Marmalade, Jams and Fruit Jellies ..	373,700	1,265,000
Fruit, Tinned or Bottled	4,900	15,000
Fruit Juices and Syrups	2,600	15,000
Bonbons and Crackers		398,000
Confectioners' Novelties and Sundries		457,000
Preserved Fruits (including Candied Peel)		198,000
Coffee Essences, Chicory, etc.		267,000
Jellies		80,000
Other Grocers' Sundries		361,000
Other Products		308,000
Total Value of Goods Made		41,225,000

Many firms chiefly engaged in the manufacture of biscuits, pastries, etc., also produce sugar confectionery and have included such production in the returns covering their main business. The total quantity of Sugar Confectionery (including Chocolate Confectionery) thus recorded on Schedules for the Bread and Biscuit Trades was 221,000 cwts., the selling value being £1,947,000 (Preliminary Reports No. 25, *Board of Trade Journal*, October 13, 1927). Further, though less important, amounts were returned by manufacturers of other food products—*e.g.*, preserved fruits and condensed milk, and these amounts will be brought into account in the later and more detailed analysis of the Census results.

The greater part of the total output of Marmalade, Jams, and other forms of preserved fruit in the year 1924 has been returned on the Schedule for the Preserved Meat, Fish, Fruit and Vegetables, Pickles and Sauces Trades (Preliminary Report No. 17, *Board of Trade Journal*, July 7, 1927). The production shown in the above table represents only that of firms who were chiefly occupied in the manufacture of cocoa products and sugar confectionery.

For the purposes of the Census of 1907, the manufacture of Marmalade, Jams, and other preserved fruits was associated with that of Cocoa and Sugar Confectionery, and the great bulk of the total production of the former class of goods was returned on the same form of Schedule as that covering the latter. The general aggregates recorded for 1907 on Schedules for this trade are, therefore, not comparable with those ascertained for 1924, in which the production of preserved fruit is only included in so far as it formed an additional and subsidiary line to that of cocoa and sugar confectionery.

In the following statement particulars are given of the production in the years 1924 and 1907 of Cocoa Products and Sugar Confectionery as recorded on Schedules for this trade and on those for the Bread and Biscuit Trades. The supplementary amounts returned elsewhere than on Schedules for these two trades were comparatively small. The particulars relate to production in Great Britain only.

Products.	1924.		1907.	
	Quantity.	*Selling Value.*	*Quantity.*	*Selling Value.*
	Cwts.	£	Cwts.	£
Cocoa or Chocolate, Manufactured (except Chocolate Confectionery) ..	1,001,600	7,970,000	527,000	2,753,000
Cocoa Husks and Shells	92,200	22,000	62,000	21,000
Cocoa Butter	77,600	487,000	38,000	304,000
Total Value—Manufactured Cocoa or Chocolate (except Confectionery)	—	8,479,000	—	3,078,000
Sugar Confectionery (including Chocolate Confectionery) ..	5,350,800	31,107,000	3,765,000	8,161,000
Cocoa and Sugar Confectionery, not separately distinguished ..	—	309,000	—	—
Total Value—Cocoa Chocolate and Sugar Confectionery	—	31,506,000	—	11,239,000

The output of Manufactured Cocoa or Chocolate was nearly 90 per cent. greater in 1924 than in 1907, the figures for both years being exclusive of the quantities prepared by cocoa manufacturers and used by them in the production of chocolate confectionery. The quantity of Sugar Confectionery (including Chocolate Confectionery) manufactured in 1924 exceeded the output of 1907 by about 42 per cent.

Exports and Imports

In the following statement the exports from and net imports into the United Kingdom of manufactured Cocoa and Chocolate and of Sugar Confectionery are compared with the aggregate figures of production in Great Britain given in the preceding table.

About one-tenth of all Cocoa and Chocolate manufactured for sale in 1924 was exported, the lower export value (£5 per cwt. as against £7 19s. per cwt. in the case of the total production) being probably due in part to the fact that over 70 per cent. of the total exports consisted of cocoa not containing sugar. In the case of Sugar Confectionery (including Chocolate Confectionery) the quantity exported was about one-twentieth of the aggregate quantity pro-

	Production.*		Exports.		Net Imports.	
	Quantity.	Value.	Quantity	Value.	Quantity.	Value.
	Cwts.	£	Cwts.	£	Cwts.	£
Cocoa or Chocolate, manufactured ..	1 001,600	7.970,000	100,500	509,000	137,700	1,282,000
Chocolate Confectionery	1,467,200	12,559,000	57 900	[illegible]	21,300	207,000
Sugar Confectionery except Chocolate Confectionery	3,662 600	16,691 000	[illegible]	1,186,000	71,300	379,000
Sugar Confectionery, not separately distinguished ..	221,000	1 947,000				
Total—Sugar Confectionery ..	5,350,800	31,197,000	[illegible]	[illegible]	[illegible]	[illegible]

* Excluding unclassified output valued at £309,000.

duced in Great Britain. Net imports consisted chiefly of sweetened chocolate in bars and blocks, obtained from Switzerland.

It appears from the particulars given above that the quantity of sugar confectionery (including chocolate confectionery) available in 1924 for consumption in Great Britain was sufficient to provide somewhat over a quarter of a pound weekly for each inhabitant, if manufactured cocoa and chocolate be included, and such duplication as may arise from the purchase, in certain cases, of chocolate for use in making confectionery be ignored, the supply would represent very nearly five ounces per head.

Net Output

The inclusion in the 1907 Census results for this trade of data relating to the jam and preserved fruit industry precludes any satisfactory comparison between the two years in regard to the net output of the trade, or to employment and mechanical power. Consequently the particulars given below in respect of these subjects are confined to the year 1924.

The net output of the factories and workshops covered by the foregoing statement was £17,133,000 in the year 1924, that sum representing the amount by which the total value of the output (£41,225,000) exceeded the cost of materials purchased and used (£24,092,000). The net output per head of persons employed was £216.

Persons Employed

The average number of persons employed during the year 1924 at the factories and workshops to which the foregoing statement of output relates was 79,496, of whom 68,458 were recorded as operatives and 11,038 as management, clerical, and technical staff. The age and sex distribution was as follows:

Ages.	1924.		
	Males.	Females.	Total.
Under 18 years	2,836	20,051	22,887
Over 18 years	23.402	33,207	56,609
Total	26,238	53,258	79,496

The highest number of operatives at work at one time during the year 1924 was 74,119 in November, and the lowest 63,285 in April.

Power

The total capacity of engines at the factories to which the above statement of production relates was shown as 16,446 horse-power, of which nearly 38 per cent. was in reserve or idle during the year. The main kinds of engine-power employed are shown below:

	Horse-power.
Steam engines, reciprocating ...	12,641
Steam turbines	120
Internal combustion engines ...	3,675
Water-power	10
Total	16,446

The capacity of electric generators at factories is given in the following table:

Driven by:	Kilowatts.
Steam engines, reciprocating ...	7,272
Steam turbines	95
Internal combustion engines ...	1,618
Water-power	2
Total	8,987

There were also recorded electric motors of a total capacity of 53,866 horse-power, of which 39,955 horse-power represented motors driven by purchased electricity, 8,207 horse-power motors driven by electricity generated at the factories, and 5,704 horse-power motors driven by electricity obtained from both sources, for which separate particulars could not be given. In the case of motors returned as driven by purchased electricity, about 6 per cent. were stated to have been in reserve or idle during the year, and about 9 per cent. of those driven by electricity generated at the works were so shown.

The contrast between the comparatively small percentage of electric motors returned as in reserve or idle and the large proportion of the steam and explosion engines so recorded may be due to the inclusion in the latter case of prime movers maintained as stand-bys, though, in fact, superseded by motors driven by purchased electricity.

(*Continued from page 488.*)

meat products can be regulated to a very large extent by cleanliness and heat treatment. In avoiding spoilage, the aim of manufacturers should be to obtain their raw material as fresh as possible, to can rapidly under optimum temperature and hygienic conditions, to use high quality tin-plate, and to employ efficient closing methods in order to ensure the presence and maintenance of a vacuum in the tins.

Important references on the subject are:

1. *Food Investigation Report*, No. 11.
2. *Bacteriology of Canned Foods* (Savage).
3. *Scientific Preservation of Food* (Rector).

The Confectioners' and Bakers' Exhibition

YET ANOTHER enterprising and admirable exhibition has completed its course. Unfortunately, we have insufficient space in which to write down all the nice things that were said to us (*not*, of course, about ourselves) at the 300 or so stands. We shall content ourselves with a brief reference to a few items by way of illustrating the scope of the exhibition.

Messrs. Baker Perkins, Limited, occupied the same prominent position in the main hall. Our attention was directed to the "Viennara" Kneader, which is having a successful career. Bakers were interested in a modified type of Flour Handling Equipment comprising elevator and sifter, and a new type of Water Tempering and Measuring Tank. The new Automatic Water Weighing and Measuring Apparatus saves not only time and labour, but insures absolutely correct quantities and temperatures. The "Multi-Spindle" Moulder was again shown; this machine is specially designed for moulding tin-bread doughs, and can be used either as part of a fully automatic plant or as a separate unit. We understand that a number of new features have been introduced into the "Nuovamixa" Whisking and Mixing Machine, and that the machine has already been installed in many confectionery establishments. Bread Wrapping Machinery was represented by the No. 1 "Baker-Sevigne" Machine, which can utilise any kind of paper for wrapping. Owing to space restriction it was not possible to show examples of all ranges of ovens, but there was on view an electrically heated, two-deck, portable oven of improved design. An item of special interest was a model of Dennistoun Bakery, demonstrating the manufacture of bread from the flour stage to the finished loaf without any handling. Confectioners were interested in the 600 lb. capacity Chocolate Melting and Mixing Kettle, fitted with patent helicoid stirrers, which obviate beating air into the mixing. The Patent Sectional Disintegrator was also exhibited, which is a development of the well-known "Woodburn" Disintegrator, and we understand that many hundreds of these have been supplied to all parts of the world. The "Fantafilla" Machine interested those who wish to measure accurately a given quantity of chocolate into egg or fancy moulds and to make single deposits into any ordinary mould. A new machine for cutting and wrapping toffee, producing square shapes of exceptionally good appearance, was shown working at a high speed.

The Forgrove Machinery Co., Limited, showed a Caramel Wrapping Machine for wrapping caramels with registered design and understrip. Another machine, shown for the first time, was the Fruit Bonbon Wrapping Machine. It has reel feeds for both printed labels and inner wax paper wrap. The Associated Chocolate Foiling Machine is fitted with improved arrangements for foiling chocolate liqueur bottles.

Wm. Gardner and Sons, Limited, exhibited the Combined Patent "Rapid" Sifter and Mixer, largely used for blending of dry powder, and for adding liquids, colourings, essences, etc., to powders. A machine which grinds and sifts in one operation, with easily interchangeable screens, is the Combined "Rapid" Grinder and Sifter. We are informed that "Rapid" Bakery Sifters are largely used in the leading bakeries and that they are very simple to work; the flour is improved by being aerated and agitated, and thus strengthened to carry its proper quantity of water in dough. We were surprised at the very small space and power required by Gardner's latest Sugar Grinding and Dressing plant; it will produce any grade of icing or castor. Another interesting machine was the Patent "Rapid" "Quick Change" Dresser for sugar, starch, colours, cocoa, chemicals, etc. A very attractive machine is the "Rapid" Drying Machine, heated by gas, steam, oil, or electricity. This progressive firm also makes vacuum and other types of drying plant, large and small.

The Hobart Manufacturing Co. showed the H.E.B. Mixer, which has several interesting features, and the Hobart Candy Machine, which combines the operations of mixing, pulling, boiling, and covering, and has a capacity of 50 tons of candy per week.

The Herbst Machinery Co. showed their Dough Dividers, which are very well received by the trade.

Chambers Motors, Limited, exhibited Dempsey's Patent Depositor for all classes of dropped goods. It deposits 6,000 cakes per hour into paper containers, etc. This machine works accurately and cleanly, and imparts a good appearance to the finished goods.

Messrs. Jones, London, and Garrard, almond millers and merchants, of Salford, were represented, as also were our old friends W. J. Bush and Co., Limited; Stevenson and Howell, Limited; Amalgamated Dairies, Limited; Bart, Newhill and Co.; British Arkady Co., Limited; Harrison Carter; and Hansella.

The Grocers' Exhibition

AMONG OTHER exhibitors at the Grocers' Exhibition, the following may be mentioned:

Amalgamated Dairies, Ltd., 3, Laurence Pountney Hill, E.C. 4.

Armour and Co., Ltd., Queen's House, Kingsway, W.C. 2.

Austin, J. E., and Co., Ltd., St. James' Works, Kingston-on-Thames.

Australian Trade Publicity, Australia House, Strand, W.C. 2.

Barnes and Co., Ltd., 2-6, Battle Bridge Lane, Tooley Street, S.E. 1.

Beach, T. W., and Sons, Ltd., Evesham, Worcs., and Hanworth, Middlesex.
Birmingham Food Supply Co., Ltd., Victoria Works, Sparkbrook, Birmingham, and 45-47, King's Road, St. Pancras, N.W. 1.
Blyth and Platt, Ltd., Watford.
British Sales, Ltd., Adelaide House, King William Street, E.C. 4.
Canning Town Glass Works, Ltd., Tower House, 40, Trinity Square, E.C. 3.
Central Currant Office (London), 10, New Bridge Street, E.C. 4.
Cheshire Cheese Federation, High Street, Whitchurch, Salop.
Cleland, Wm. W., Ltd., Cullingtree Factory, Belfast, and Chichester House, Chancery Lane, W.C. 2.
Cook (Donald) and Son, Ltd., 19-20, West Smithfield, E.C. 1.
Cooper and Layman, Ltd., 30, Mincing Lane, E.C. 3
Daws Fruit Cordials, Ltd., 78, Claybrook Road, Hammersmith, W. 6.
Dean, G. H., and Co., Ltd., Sittingbourne, and St. Nicholas Street, Lewisham High Road, S.E. 8.
Empire Marketing Board and Department of Overseas Trade, 2, Queen Anne's Gate Buildings, S.W. 1.
Field and Co. (Fruit Merchants), Ltd., Turban House, 3, Eastcheap, E.C. 3.
Fletchers Sauce Co., Ltd., Selby.
Hancock, Corfield, and Waller, Ltd., Imperial Works, Mitcham.
Harris (Calne), C. and T., Ltd., Calne, Wilts.
Hartley, Wm. P. (London and Aintree), Ltd., Green Walk, Tower Bridge Road, S.E. 1.
Hobart Manufacturing Co., Ltd., Hobart House, Charterhouse Street, E.C. 1.
Hugon and Co., Ltd., Ogden Lane, Openshaw, Manchester.
Hunt, John (Bolton), Ltd., Alma Works, Rasbottom Street, Bolton.
Joseph, N. C., Ltd., St. Eloi Aluminium Works, Stratford-on-Avon.
Jones, D., Dickinson and Co., Ltd., Dowlais, South Wales.
K. O. Cereals Co., Ltd., ("Peterkin"), 20, Vicarage Road, Battersea, S.W. 11.
Lane, Henry A., and Co., Ltd., 37-45, Tooley Street, S.E. 1.
Libby, McNeill, and Libby, Ltd., 8, Great Tower Street, E.C. 3.
Lyons, J., and Co., Ltd., Bakery Dept., Cadby Hall, Kensington, W. 14.
Lyons, J., and Co., Ltd., Wholesale Tea Dept., Cadby Hall, Kensington, W. 14.
Maclo, Ltd., 130, Southwark Street, S.E. 1
Maconochie Bros., Ltd., Millwall, E. 14, Lowestoft, Fraserburgh, and Stornoway.
Mansell, Hunt, Catty and Co., Ltd., Cressy Road, Hampstead, N.W. 3.
Marmite Food Extract Co., Ltd., 59, Eastcheap, E.C. 3.
Marsh and Baxter, Ltd., Brierley Hill, Staffs.
Mason, G., and Co., Ltd., Chelsea Works, Walham Green, S.W. 6.
Maybury, Darby and Co., Ltd., 17, Harp Lane, E.C. 3.
Meredith Bros., 71, Eastcheap, E.C. 3.
Mills, A. J., and Co., Ltd. (N. V. H. Hartog' Fabrieken, Oss, Holland), Colonial House, Tooley Street, S.E. 1.
Nelson Preserving Co., Ltd., Aintree, Liverpool.
Newball and Mason, Nottingham.
New Zealand Dairy Produce Board, Adelaide House, London Bridge, E.C. 4.
Noel, L., and Sons, Ltd., Soho Works, Clink Street, S.E. 1.
Norton, E. P., Cheshire Cheese Factor, Whitchurch, Salop.
Plaistowe and Co., Ltd., Minto Street, S.E. 1.
Pure Lemon Juice Co., Ltd., Sumner Road, Croydon
Rawlings, H. D., Ltd., Neate Street, Camberwell, S.E. 5.
Rayner and Co., Ltd., Bourbon Works, North Road, N. 7.
Ryvita Company, 96, Southwark Street, S.E. 1.
Savage and Co., 28, Love Lane, Eastcheap, E.C. 3.
Schweppes, Ltd., Marble Arch House, 1, Connaught Place, W. 2.
Scott, Preserve Makers, Ltd., Silverdale Works, Hayes, Middlesex.
Senior, J. H., and Co., Ltd., 1, Willard Street, Wandsworth Road, S.W. 8.
"Seraflo," Ltd., Self-raising Flour Mills, Dartford, Kent.
Sharwood, J. A., and Co., Ltd., 10, Botolph Lane, E.C. 3, and Offley Works, Offley Road, S.W. 9.
Silverdale Tea Co., Ltd., 1, Paul Street, E.C. 1.
Simpson, Roberts and Co., Ltd., 40, Botolph Lane, Eastcheap, E.C. 3, and 46, Stanley Street, Liverpool.
Southall and Smith, Ltd., Villa Street Works, Hockley, Birmingham.
Sparagnapane, Ltd., 204-208, New North Road, N. 1.
Spillers, Ltd., 40, St. Mary Axe, E.C. 3.
Stark, H. H., Ltd., 193, Whitechapel Road, and 43-47, Vallance Road, E. 1.
Stevens Bros., The "Big Cake" Bakeries, 20, The Pavement, Clapham Common, S.W. 4.
Sun-Maid Raisin Growers, Ltd., 59, Eastcheap, E.C. 3.
Sunrise Preserving Co., Ltd., Minto Street, S.E. 1.
Sutcliffe, J. W., and Co., 10-14, Gardiner House, Charterhouse Street, Holborn Circus, E.C. 1.
Tickler, T. G., Ltd., Southall.
Turner and Son, Ltd., 38, Goldsmith Street, Nottingham.
"Tyne Brand" Products, Fish Quay, North Shields.
Uno Co., Ltd., 90, Minories, E. 1.
Van Den Berghs, Ltd., 26, St. Martin's-le-Grand, E.C. 1.
Virol, Ltd., Hangar Lane, Ealing, W. 5.
Wall, T., and Sons, Ltd., The Friary, Acton, W. 3.
Wallis Tin Stamping Co., Ltd., Lion Works, Love Lane, Shadwell, E. 1.
Wiles and Lewis, Ltd., "Ariston" Works, St. Albans, Herts.
Wisbech Produce Canners, Ltd., Lynn Road, Wisbech.

Overseas News

Japanese Food Regulations

MR. H. B. TITUS, of the Tokyo office of the Bureau of Foreign and Domestic Commerce, has just forwarded the details of a new Japanese ordinance covering the use of preservatives in foods and drinks. This regulation, issued on June 15, 1928, prohibits the use of the following chemicals and bleaching agents and their compounds in the manufacturing and preserving of foodstuffs or drinks for sale in Japan, unless specifically authorised by other ordinances:

Benzoin	Compounds of bismuth and silver
Sulphur dioxide	Fluorine
Boric acid	Cinnamic acid
Hydrofluoric acid	Thymol
Salicylic acid	Aldehydes
Corrosive sublimate	Furfural
Naphthol	Chloral
Resorcin	
Sodium nitrate	

The ordinance provides that the use of any preservatives or bleaching agents in the manufacture of foodstuffs or drinks for sale in Japan is permitted only under authority of the Prefectural Governor in the Prefecture, where the applicants' offices are located, or in Tokyo under authority of the Metropolitan Police. In applying for permission to use any preservatives or bleaching agents in foods or drinks, the applicant must state the nature of the process and the materials used. The sale of chemicals to be used as preservatives or bleaching agents is permitted only under authority of the local officials, and if the chemical is not recognised at present by the Home Department, samples must be submitted with the application. Packages containing foods or drinks in which chemical preservatives or bleaching agents are used must indicate on the labels the chemicals used, the quantity, and the name and address of the manufacturer. A second ordinance modifies the provisions of the above ordinance to the extent of permitting the use of sulphur dioxide and benzoate of soda as preservatives in foods and drinks. Provision is made, however, that if either of these chemicals is used, the name of the chemical and the quantity must be marked on the package or label. The amount of these chemicals permitted in the commodities specified is as follows (quantities are expressed as milligrams per kilo or per litre, which is practically equivalent to parts per million):

Sulphurous acid (H_2SO_3) and thiosulphuric acid ($H_2S_2O_3$): Dried apricots, 1,000; gelatine, 500; sugar, 200; molasses, 300; millet jelly, 30; wine and beer, 200 milligrams and 20 milligrams per litre respectively.

Benzoic acid ($C_6H_5CO_2H$) and benzoate of soda ($C_6H_5CO_2Na$): Fruit juices, 600; fruit syrups, 800.

Market for Powdered Milk in Liberia

Liberia appears to be a potential market for limited quantities of powdered whole-milk. At present no local firms import this product, and milks offered for sale are condensed, evaporated, one malted milk of American manufacture, and two infant foods with milk content.

Fresh milk is purchased from English refrigerator steamers which call at Monrovia not more often than twice a month. This milk contains a preservative, and the milk in this way can be kept on ice from eleven to fourteen days *en route* to Liberia. No milk is produced by native cows here, and all milk must be imported either from refrigerator ships or in tins.

It is believed the following statistics will give an idea of the extent of the market. The figures cover the year 1926 and one dozen tins is the unit of quantity.

IMPORTS OF CONDENSED AND EVAPORATED MILK, MONROVIA.

England ..	.. 4,152	£816	Germany ..	.. 3,045	£487
Holland ..	.. 3,209	£501	United States	.. 889	£203
France ..	.. 176	£25	Others ..	.. 18	£6

With regard to the preparation of powdered milk for export to Liberia (and the entire West Coast of Africa), it is necessary to have the milk packed in hermetically sealed tins or glass bottles. The climate is tropical, and unless dry milks are properly packed they deteriorate very rapidly. The storage life of milk seems to be from nine months to one year. Condensed milk is usually packed in 7 and 14 ounce tins, 48 to the case, and evaporated milk is packed in 6 ounce tins and 12 ounce tins. Dry milk may be packed in any size package desired, and, it is believed, 1 pound tins will be more easily sold. Taking into consideration the comparatively low purchasing power of the people of this district and other parts of the West Coast, it may be advantageous to introduce powdered whole-milk in ½ pound and 1 pound tins. All labels, trade literature, and correspondence for Liberia should be in English.

Purchasers of milk are limited to the European and American group, numbering about 400 persons, and to the better class of natives and Americo-Liberians of not more than 12,000 persons.

Regulations Governing the Importation of Condensed, Evaporated, and Dried Milk into the Colony of Fiji

The attention of milk manufacturers and exporters is called to the regulations received by the Department of Commerce from Quincy F. Roberts, at Suva, under date of July 10, governing the importation of condensed, evaporated, and dried milk into the

Colony of Fiji. Under Proclamation No. 6, issued by the Acting-Governor on May 4, 1928, the importation of the following preserved milk is prohibited:

1. Condensed milk, unsweetened, containing less than 8·5 per cent. of butter fat.
2. Condensed milk, sweetened, containing less than nine parts per cent. of butter fat.
3. Milk powder and dried milk when mixed with water, according to directions containing less than 8·5 parts per cent. of milk solids not fat, and 3·2 parts per cent. of butter fat.

While the foregoing proclamation does not specifically mention evaporated milk, condensed milk is interpreted to cover evaporated, and the provision requiring 8·5 per cent. butter fat is applied to evaporated milk. Two cases of evaporated milk recently imported from the United States by a local firm were prohibited entry under the proclamation. In the analysis of a sample tin from one of the cases it was found that the butter fat content was 8·02 per cent., or ·48 of one per cent. less than the standard fixed in the proclamation.

Australian Canned and Dried Fruit Notes

From the total quantity of 39,303 short tons of fruit shipped during the 1927 season to Great Britain at the end of May, 30,264 short tons had been sold, including all the currants and lexias, and 22,586 short tons of sultanas, the average price of which was approximately £5 10s. a ton, according to a recent report from Trade Commissioner E. C. Squire, at Sydney. In view of the fact that the shipments of sultanas to the United Kingdom last season amounted to the record figures of 31,709 short tons, as against 12,757 short tons in 1926-27, and 14,538 short tons in 1925-26, the sales of 22,586 short tons recorded against last season's shipments is considered to be quite satisfactory in Australia, as compared with a total of 12,433 short tons sold at the corresponding period last year. The carry-over of Australian sultanas in Great Britain now amounts to approximately 9,000 short tons.

The Australian currant crop (as a result of frost damage) is extremely light this year. The total Australian crop for 1928 will be between 6,000 short tons and 67,000 short tons, as against 12,880 short tons in 1927. Two-thirds of the crop will be sold in the Commonwealth market at protected values, and the export quota will be sold in markets on which Australia has a preferential tariff.

At the present time the Australian canned fruit industry is facing a serious position. In the first place, there is much more fruit canned than is needed for Australian requirements, yet even with an export bounty of 36 cents per dozen tins of peaches, there is still a heavy loss on export.

The pack in 1928 was 37,000,000 tins; Australian consumption is about 18,000,000 tins, leaving a balance of 19,000,000 tins for export, coupled with a carry-over of about 4,000,000 tins. The grower is finding that the costs of production are steadily mounting, and the price of the fruit is reducing. The canneries are badly hit through increased costs of production and the losses that have to be faced on export. At the present time an investigation is being conducted by the Development and Migration Commission, and the result of this report is awaited with interest.

New Zealand Canned and Dried Fruit Trade

An analysis of the trade returns of New Zealand, including those for 1927, show (1) that South Africa has been dominating that country's importation of evaporated fruit (omitting prunes, supplied mostly by the United States), and that South Africa's leading line is dried apricots, of which New Zealand imported £42,969 worth in 1927, according to a report of June 30 from J. B. Foster, at Wellington; (2) Australia commands the New Zealand importation of currants, as she supplied £32,128 worth in 1927, against £4,874 from Greece; (3) in 1927 Australia and the United States divided New Zealand's raisin and sultana importations in the proportion of £130,644 to £87,046; (4) in canned apricots and peaches Australia sent £165,848 worth and the United States sent £6,068 worth.

While the United States producers are competing more strongly this year in canned lines, they have a South African competitor, who is limited in volume of offerings as compared with America and Australia, but is sending a product which is regarded by the trade as of good quality, and (at present) suitably priced. Moreover, a new factor is South African jams. The New Zealand jam market is affected both by South African jams and by the advertised advocacy of South African dried apricots and dried peaches for home-made jams, being allegedly cheaper than New Zealand fresh fruit. Thus the activities of South Africa are of some concern to importers of jams, and to manufacturers of jams and to fruit-growers.

Californian canned apricots and peaches have been cheaper this year than Australian, and South African (in limited quantity) were cheaper still. South African were about 5 per cent. cheaper than Californian, and Californian were about 5 per cent. cheaper than Australian. This was the first year of importation into New Zealand of South African canned, and, judging by the quality, and if the price next year was competitive, importations from South Africa would greatly increase.

The Henry Jones Company, which some time ago acquired the jam and preserves industries of Kirkpatrick (Nelson) and Thompson and Hills (Auckland), now controls jam and allied interests in the three countries—New Zealand, Australia, and South Africa. The entry here of South African jam, and

the continued competition of the Nelson and Auckland industries, were phenomena of 1928. It was thought that when the two New Zealand industries were acquired by one Australia-New-Zealand-South-African company, they would not compete so keenly for fruit supplies.

Dried fruits: New season's quotations for prunes show a decided advance over last year's low rates. Prices are, however, fairly low compared with earlier years. Californian muscatels also show an advance over last year's low rates, but it is early in the season for much interest in these. Crystallised cherries show a further advance. The general run of dried fruits for the rest of the year promises to be very cheap, low prices for seeded and seedless raisins competing keenly with all other varieties, but currants and sultanas are holding their price.

With regard to the mass figures as to raisin and sultana importations, imported seeded raisins are exclusively American. Sultanas are in two classes, and American are quite different in texture and otherwise than Australian or Mediterranean. American sultanas appear to be particularly for the pastry-cooks' trade, and are of different prices, ruling about 33 per cent. below Australian prices. Mediterranean and Australian sultanas are of particular quality, each having its own special value; but, at present, Mediterranean have been unable to compete in New Zealand with Australian.

Canned Fruits: Auckland and Nelson canned pears are selling at cheaper rates than imported, quality for quality, and it looks as if these are going to secure the bulk of the trade in this variety of fruit for the rest of the year.

In peaches, most sales appear likely to run on the Australian canning, whereas in apricots there is nothing at present to compete with South African. These have been imported in large quantities, the price being helped by a bumper crop. Californian are being imported in any varieties that happen to be in short supply, and it looks as if these will be utilised for the trade in any cheap grades and also in the extra special quality.

Condensed Milk Project for Potchefstroom, South Africa, Abandoned

Dairy interests in the Potchefstroom district are extremely disappointed with the announcement that the South African Condensed Milk Company have decided not to carry out their project of erecting a factory in Potchefstroom, according to a report of July 10, 1928, from W. L. Kilcoin, at Johannesburg.

When the company decided to erect a factory in the Transvaal, Potchefstroom and Standerton were left in the competition for the site of a condensery, and when the company, after exhaustive inquiry, favoured Potchefstroom, accepting the generous terms for land, water, and power offered by the municipality, the scheme was heartily welcomed.

Difficulties arose, however, when the price of imported condensed milk fell to a figure at which the South African Company contended they could not compete, and a deadlock ensued when the Government decided that it could not put on extra protective duties.

Norwegian Fish Canning

During the June quarter of this year the catch of mussa (small herring) was a failure. The brisling fishing season opened on May 21, but there were practically no takings before the beginning of June. In the Stavanger Consular District, on account of unusually low temperatures, the catch was practically absent. On other parts of the coast some fish have been caught. The mackerel fishing began in the middle of May and has been successful. The total catch in the Stavanger District is placed at about 950,000 kilos, compared with 400,000 in 1927. The total catch for Norway is reported to be about 5,026,000 kilos, of which about 950,000 were exported on ice, 31,500 kilos were canned, about 3,500,000 kilos sold fresh, and the remainder salted.

The canning factories have been idle most of the quarter. The total quantities of brisling and mussa delivered to the canners were said to be sufficient to keep the local canning factories operating about half time. Very small quantities of mackerel were packed, the canners stating that there was no demand at the present time and stating that considerable stocks from the past year were on hand. The demand was strong for sardines. There are practically no unsold stocks of mussa and brisling sardines, and with the increasing demand prices are firm and advancing. The canners are apparently not disposed to make any future sales.

Fish Packing in Vigo, Spain

According to a report received from W. H. McKinney, at Vigo, Spain, under date of July 17, 1928, there has been an abundance of fish for canning during the past three months. Sardines were more plentiful during the period than for many years, and prices of the raw fish reached unprecedented low figures. Raw fish have sold as low as 15 pesetas per cesta of 165 pounds, but this price was so low that fishing was suspended until the price reached 30 pesetas.

The Association of Fish Packers has petitioned the Central Government for a diplomatic intervention with the Governments of several foreign countries to permit the importation of Spanish fish in tins bearing labels either in Spanish, French, or English. The policy followed by some Governments in demanding that the containers be labelled in the language of the importing country is causing much trouble to the packers, since such goods must be packed to order and cannot be shipped from warehouse stocks.

Sockeye Salmon in British Columbia

A preliminary report from Mr. John P. Babcock, Deputy Minister of Fisheries for British Columbia, states that runs of sockeye salmon to the northern rivers of British Columbia have been far below expectation, but there have been large runs of pinks and chum salmon.

This is a "pink" year, and canneries have been operated to capacity, with a large pack anticipated, as the run has only commenced. The fish are reported large and in prime condition.

The pack of sockeye salmon, however, will be relatively light.

Commercial and Legal News

(The Editor does not accept responsibility for any errors which may occur in the following notices.)

New Companies

GEORGE CHARLTON AND SONS, LIMITED. (232788) Regd. Aug. 20, 1928. To take over the bus. of egg and yeast mchts. and wholesale dlrs. cd. on at 22, Cromwell Street, Sunderland, as "George Charlton and Sons." Nom. Cap.: £2,000 in £1 shares.

CENTRAL STORES (AMERSHAM ON THE HILL), LIMITED. (232780) Regd. Aug. 20, 1928. The Central Stores, Sycamore Road, Amersham, Bucks. To carry on the bus. of grocers and provision mchts, butchers, oil and colour men, etc. Nom. Cap.: £2,000 in £1 shares.

CREAM OF CEREALS, LIMITED. (232812) Regd. Aug. 21, 1928. The Oto Factory, Works Road, Letchworth. To take over the bus. of dlrs. in puffed cereals and other foods cd. on as the "Garden City Foods and Confections Co." Nom. Cap.: £2,500 in 4,000 preference shares of 10s. each and 10,000 ordinary shares of 1s. each.

"MY TEA" COMPANY, LIMITED. (232835) Regd. Aug. 22, 1928. 6 and 7, Market Square, Stafford. To carry on the bus. of tea mchts. and dlrs., etc., Nom. Cap.: £300 in £1 shares.

RYMER BROTHERS, LIMITED. (232875) Regd. Aug. 23, 1928. 8, Millgate, Thirsk, Yorks. To take over the bus. of corn millers and mchts. cd. on at and near Thirsk, as "Rymer Bros.," and the bus. cd. on at Thirsk as the "Thirsk Model Bakery." Nom. Cap.: £12,000 in £1 shares.

HITCHCOCK BROTHERS, LIMITED. (232863) Regd. Aug. 23, 1928. 70-75, Avenue Chambers, Southampton Row, W.C.1. To carry on the bus. of buyers and sellers, catchers, packers, and canners of fish of all kinds; ice mchts., dairymen, and provision mchts, etc. Nom. Cap.: £100 in £1 shares.

WILLIAM CATON, LIMITED. (232908) Regd. Aug. 24, 1928. Mill End, Clavering, Essex. To take over the bus. of a corn mcht. and grocer cd. on at Clavering, Essex. Nom. Cap. £1,500 in £1 shares.

SOUTHERN COUNTIES STORES, LIMITED. (232957) Regd. Aug. 27, 1928. To carry on the bus. of grocers, blenders of and dlrs. in tea and coffee, etc. Nom. Cap. £100 in £1 shares.

EASTERN COUNTIES STORES, LIMITED. (232944) Regd. Aug. 27, 1928. To carry on the bus. of grocers, blenders of and dlrs. in tea and coffee, etc. Nom. Cap.: £100 in £1 shares.

WELSH COUNTIES STORES, LIMITED. (232961). Regd. Aug. 27, 1928. To carry on the bus. of grocers, blenders of and dlrs. in tea and coffee, etc. Nom. Cap.: £100 in £1 shares.

ANGLO-SCOTTISH CREAMERIES, LIMITED. (232963) Regd. Aug. 28, 1928. Cheyne Works, Milman's Street, Chelsea, S.W. To carry on the bus. indicated by the title. Nom. Cap.: £500 in 2,000 ordinary shares of 1s. each, and 400 deferred shares of £1 each.

AUTOPAX, LIMITED. (232962) Regd. Aug. 28, 1928. To carry on the bus. of importers, exporters, and packers of and dlrs. in fruit and vegetables, confectionery, etc. Nom. Cap.: £500 in £1 shares.

CHRISTYS, LIMITED. (232986) Regd. Aug. 29, 1928. 115, Lapwing Lane, West Didsbury, Manchester. To carry on the bus. of bakers, confectioners, caterers, etc. Nom. Cap.: £3,000 in £1 shares.

A. J. SIMMONS, LIMITED. (232912) Regd. Aug. 25, 1928. 160, High Street, Chatham. To take over the bus. of a baker and confectioner cd. on at High Street, Chatham, and 9, High Street, Old Brompton, Gillingham, Kent. Nom. Cap.: £2,000 in £1 shares.

SCUNTHORPE SWEETS, LIMITED. (233049) Regd. Aug. 31, 1928. To take over the bus. of toffee and sweet mnfrs. and retailers cd. on at Scunthorpe and Frodingham, Lincs., by Radiance, Ltd. Nom. Cap.: £3,000 in £1 shares.

BROADHURST AND CO. (GADBROOK), LIMITED. (233059) Regd. Sept. 1, 1928. Gadbrook, near Northwich, Ches. To take over the bus. of a wholesale and retail cake and biscuit mnfr. cd. on at Gadbrook, near Northwich, by F. J. Broadhurst. Nom. Cap.: £31,000 in £1 shares (26,000 preference and 5,000 ordinary).

LIMMER AND PIPE, LIMITED. (233062) Regd. Sept 1, 1928. 74A, Regent Street, W.1. To take over the bus. of wholesale and retail grocers, provision mchts and confectioners, wine, spirit and cigar mchts., etc., cd. on at Ipswich or elsewhere, as Limmer and Pipe. Nom. Cap.: £30,000 in £1 shares.

ROSE'S STORES (ST. LEONARDS), LIMITED. (233106) Regd. Sept. 3, 1928. 19, Marina, St. Leonards-on-Sea. To take over the bus. of a grocer and provision mcht. cd. on at 4, South Colonnade, St. Leonards-on-Sea, as Rose's Stores. Nom. Cap. £3,000 in £1 shares.

DAIRYMAIDS, LIMITED. (233084) Regd. Sept. 3, 1928. Dairymaid Hall, The Market, Swansea. To carry on the bus. of dairymen, cheese, butter, and sausage mnfrs. and mchts., etc. Nom. Cap.: £500 in £1 shares.

R. STODDARD AND SONS, LIMITED. (233104) Regd. Sept. 3, 1928. 107, Icknield Street, Birmingham. To enter into an agreement for the acquisition of the bus. of ham and bacon curers, butchers, and grocers

and provision mchts. cd. on at Icknield Street, Carver Street, and Soho Road, all in Birmingham, and Bearwood Road, Smethwick, near Birmingham. Nom. Cap.: £15,000 in £1 shares.

A. E. ROBINSON AND CO., LIMITED. (233148) Regd. Sept. 6, 1928. To take over the bus. of a produce broker cd. on at 59-60, Mark Lane, E.C.4, as A. E. Robinson and Co. Nom. Cap.: £4,000 in £1 shares.

J. ROBERTS (NEWCASTLE), LIMITED. (233186) Regd. Sept. 7, 1928. To carry on the bus. of mnfrs. and retailers of pickles, sauces, jams, and preserves, etc. Nom. Cap.: £600 in £1 shares.

ARTHUR LLEWELLYN AND SONS, LIMITED. (233203) Regd. Sept. 8, 1928. Park End Stores, Llanishen, Glam. To take over the bus. of a grocer and provision mcht. cd. on at Llanishen by A. Llewellyn. Nom. Cap. £1,000 in £1 shares.

WILLIAM CHARNLEY, LIMITED. (233270). Regd. Sept. 11, 1928. To take over the bus. of pickle and sauce mnfr., bottler, etc., cd. on at Bella Street, Bolton, as William Charnley. Nom. Cap.: £2,000 in £1 shares.

TRIUMPH CONFECTIONERY COMPANY, LIMITED. (233292) Regd. Sept. 12, 1928. Allen Street, Lower Broughton, Manchester. To take over the bus. of confectioners and sweet and sugar boilers cd. on as the Triumph Confectionery Co., and, in particular, the registered trade mark "Triumph." Nom Cap.: £100 in £1 shares.

OCEAN TRADING COMPANY, LIMITED. (233317) Regd. Sept. 13, 1928. 115, Wavertree Road, Liverpool. To carry on the bus. of mnfrs. of and dlrs. in foodstuffs of all kinds, etc. Nom. Cap.: £100 in £1 shares.

SNOWDENS BAKERS, LIMITED. (233436) Regd. Sept. 19, 1928. 6, North Railway Street, Seaham Harbour, Co. Durham. To take over the bus. of grocers and bakers cd. on at Seaham Harbour by A. Snowden and E. Snowden. Nom. Cap. £3,500 in £1 shares.

THOMAS JONES (WHOLESALE MERCHANTS), LIMITED. (233351) Regd. Sept. 14, 1928. Wyndham Street, Cardiff. To carry on the bus. of wholesale and retail grocers and genl. provision mchts., etc., Nom. Cap.: £6,000 in £1 shares (2,000 preference and 4,000 ordinary).

MATÉ-VITA, LIMITED. (233467) Regd. Sept. 20, 1928. To carry on the bus. of mnfrs. of and dlrs. in Maté-Vita tea and any other patent or proprietary foods, medicines, etc. Nom. Cap.: £750 in £1 shares.

London Gazette Information

Voluntary Liquidations.

(Note.—Voluntary liquidations may, in some instances, refer to companies in course of reconstruction.)

CAERSWS AND DISTRICT DAIRY ASSOCIATION, LIMITED. Resolved, August 13, that the Society cannot, by reason of its liabilities, continue its business, and that it be wound up voluntarily; further, that Mr. E. C. Morgan, I.A., of Newtown, Mont., be appointed liquidator.

EVERCREME TOFFEE CO., LIMITED. Resolved, August 28, that the Company cannot, by reason of its liabilities, continue its business, that it be wound up voluntarily, and that Mr. E. Bairstow, 1, King Cross Street, Halifax, be appointed liquidator. Claims should be sent to the liquidator by October 11.

FRIED FISHERIES, LIMITED. Resolved, August 31, that the Company be wound up voluntarily, and that Mr. E. A. Shock, Acct., 34, London Wall, E.C., be appointed liquidator. Claims should be sent to the liquidator by November 30. (Note.—This notice is merely formal to comply with the Companies Acts. All creditors have been, or will be, paid in full.)

FOODSTUFFS, LIMITED. General Meeting of members of this Company will be held at 371-377, Corn Exchange Buildings, Manchester, on October 12, at 3 p.m., to hear the liquidator's report showing how the winding-up has been conducted. Liquidator: Mr. E. Oates.

"PACKER (THE TABLE DELICACY SPECIALIST)" LIMITED. Creditors of this Company should send in their claims by October 9 to the liquidator, Mr. L. Aspinall, F.S.A.A., 32, Talbot Road, Blackpool.

THE NEW PHŒNIX BREWERY, LIMITED (in voluntary liquidation). A General Meeting of the members of this Company will be held at the offices of Messrs. Oakley and Williams, 118, Queen Victoria Street, E.C.4, on October 12, at 2.30 p.m., to hear the liquidator's report showing how the winding-up has been conducted. Liquidator: Mr. E. W. Oakley.

Partnership Dissolved.

H. WHITTAKER AND CO. (C. Dawson and J. Ditchfield), Mineral Water Manufacturers, Rosehill Works, Heywood, near Manchester. Mutual dissolution as from August 22. Debts by C. Dawson, who continues the business.

Companies Acts.

Release of Liquidator.

E. AND T. PINK AND PLAISTOWE (PROPRIETARY), LIMITED, Minto Street, Bermondsey, London. (00329 of 1926.) Liquidator: Mr. F. S. Price, 3, Frederick's Place, Old Jewry, E.C.2. Release, August 20, 1928.

FOOD MANUFACTURE is sent to any address in the World for 10s. per annum. Send your subscription now to LEONARD HILL, LTD., Thanet House, 231-2, Strand, London, W.C.2.

Current Literature

Fruit and Vegetable Products

134. Acids in Figs. E. K. Nelson. (*J. Amer. Chem. Soc.*, 1928, 50, 2012-2013.)

135. Chlorine Content of Canned Sauerkrout. M. E. Stark. (*J. Lab. Clin. Med.*, 1927, 12, 561-563.)

136. The Chemistry of Wine-making. J. A. Gardner. (*J. Soc. Chem. Ind.*, 1928, 47, 948-949.)

137. Carbonation of Beet Juice. (*Inter. Sugar Jour.*, 1928, 30, 476-478.)

138. Silver Benzoate Test for Olive Oil. (*Oil and Fat Ind.*, 1928, 5, 206.)

139. Fruit Juices and Fruit Juice Beverages. J. H. Irish (*Fruit Prods. Jour.*, 1928, Aug., 17-21.)

140. More Data on Apple By-Products and Cull Utilisation. C. R. Fellers. (*Fruit Prods. Jour.*, 1928, Aug., 10-12.)

Cereal Products

141. Some Aspects of the Effect of Heat upon Flour. D. W. Kent-Jones. (*Cereal Chem.*, 1928, 5, 235-241.)

142. Effect of Dry Skim Milk on Baking Quality of Various Flours. Emily Grewe. (*Cereal Chem.*, 1928, 5, 242-255.)

143. Some Applications of Spectrophotometric Methods to Baking Problems. Eva L. Stephens, Alice M. Child, and C. H. Bailey. (*Cereal Chem.*, 1928, 5, 256-268.)

144. Prolamine in Wheat Flour. R. Herzner. (*Z. Unters. Lebensm.*, 1928, 55, 262-274.)

145. Mastication Test for Sand in Flour. W. Plahl. (*Z. Unters. Lebensm.*, 1928, 55, 294-295.)

146. Chemical Composition and Nutritive Value of Yellow and White Oats. F. Honcamp, W. Schramm, and H. Wiessmann. (*J. Landw.*, 1928, 76, 113-127.)

147. Fumigation of Grain, Flour, Foods, and Seeds in a 500-Cubic Foot Plymetl Vault. L. F. Hoyt. (*Ind. and Eng. Chem.*, 1928, 20, 931-932.)

Dairy Products

148. Neutralisation of Milk and its Detection. R. Strohecker. (*Z. Anal. Chem.*, 1928, 74, 1-28.)

149. Apparent Viscosity of Milk as Influenced by Some Physical Factors. G. M. Bateman and P. F. Sharp. (*J. Agric. Res.*, 1928, 36, 647-674.)

150. Determination of Milk in Caramel, etc. W. Hartmann. (*Pharm. Zentr.*, 1928, 69, 337-339.)

151. Cryoscopic Examination of Milk and Determination of the "Cryolac Number" and the Chlorine-Sugar Number. J. Fiehe and W. Kordatzki. (*Z. Unters. Lebensm.*, 1928, 55, 251-262.)

152. Evaluation of Milk. J. Gerum. (*Z. Unters. Lebensm.*, 1928, 55, 274-283.)

153. Action of Halogens on Milk and its Constituents. A. J. J. Vande Velde. (*Natuurwetensch. Tijds.*, 1928, 10, 66-72.)

154. Chemical Composition of Certain Italian Milk-Foods. L. Settimj. (*Atti R. Accad. Lincei*, 1928, [vi.], 7, 586-589.)

155. Fat Losses in Buttermilk. W. B. Combs. (*World's Butter Rev.*, 1928, 2, No. 3, 9-10, 20.)

156. Determination of Butyric and Caproic Acids in Butter Fat. A. I. Virtanen [with L. Pulkki]. (*Z. Anal. Chem.*, 1928, 74, 321-330.)

157. Influence of Temperature on Rate of Corrosion of Copper by Milk. G. N. Quam, E. I. Solomar, and A. Hellwig. (*Ind. and Eng. Chem.*, 1928, 20, 930-931.)

Various

158. Colour-Producing Constituents of the Cacao Bean. W. B. Adam. (*Analyst*, 1928, 53, 369-372.)

159. Occurrence of Starch in Oily Seed-Kernels used as Foodstuffs. C. Griebel. (*Z. Unters. Lebensm.*, 1928, 55, 236-239.)

160. Relationship between Digestibility of Fish Flesh prepared by Different Methods and its Water Content. B. Glassman. (*Z. Unters. Lebensm.*, 1928, 55, 231-235.)

161. Effect of Onion and Garlic on the Growth of Bacteria in Sausages. E. Danielsen. (*Z. Unters. Lebensm.*, 1928, 55, 291-294.)

162. Sanitary Evaluation of Flesh Foods. L. M. Horovitz-Vlassova. (*Z. Unters. Lebensm.*, 1928, 55, 239-246.)

163. Cooking of Foods under Pressure. J. Froidevaux. (*Ann. Falsif.*, 1928, 21, 252-257.)

164. New Fatty Acid from a Fish Oil. H. Marcelet. (*Compt. rend.*, 1928, 187, 145-146.)

165. The Spore Forming Bacteria of Canned Foods. G. Grindrod. (*Canning Age*, 1928, 9, 765-767, 770.)

166. Spore Forming Bacteria that have Caused Food Spoilage. G. Grindrod. (*Canning Age*, 1928, 9, 691-696.)

167. Textures of Ice-Creams as Influenced by Some Constituents. M. H. Given. (*Ind. and Eng. Chem.*, 1928, 20, 966-968.)

Analysis

168. Properties of Cacao Butter and Detection of Foreign Fats in Chocolate. D. Albers. (*Chem. Weekblad*, 1928, 25, 235-239.)

169. Determination of Hydrocyanic Acid in Lima Beans, with Special Reference to the most favourable P_H for Glucose Fission. S. K. Hagen. (*Z. Unters. Lebensm.*, 1928, 55, 284-291.)

170. Determination of the Inorganic Constituents of Honey. E. Elser. (*Z. Unters. Lebensm.*, 1928, 55, 246-251.)

171. Analysis of Vanillin and Vanillin Sugar. J. Pritzker and R. Jungkunz. (*Chem. Zeit.*, 1928, 52, 537.)

172. Detection of Isopropyl Alcohol in Brandy by means of Piperonal. G. Reif. (*Z. Nahr. Genussm.*, 1928, 55, 204-214.)

173. Tests for the Incipient Rancidity of Fats. W. L. Davies. (*J. Soc. Chem. Ind.*, 1928, 47, 185-187T.)

Recent Patents

These particulars of New Patents of interest to readers have been selected from the "Official Journal of Patents," and are published by permission of the Controller of H.M. Stationery Office.

Latest Patent Applications

24,752. GRINDROD, G.: Manufacture of food products, etc. August 29.

24,938. I. G. FARBENINDUSTRIE AKT.-GES.: Production of yeast. August 30.

24,951. GFELLER, E.: Preservation of butter, etc. August 30.

24,957. NYROP, J. E.: Manufacture of milk powders, etc. August 30.

25,071. DEHN, F. B. (HONEY BUTTER CO.). Producing food products. August 31.

Specifications Published

292,463. BLINCOW, J. E.: Containers for the cooking of meats.

292,554. WRIGHT, F. H., AND LEWIS, E. W.: Power-driven food-mixing machines.

292,619. OWEN, DR. B. J., AND STEAD, J. C.: Method of and means for preserving sugar-beets for the production of sugar therefrom.

293,012. PENFOLD, A. H.: Preserving eggs.

293,462. EGG PATENTS, LTD., AND MILROY, A.: Process for preserving eggs, egg yolks, and egg whites.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at the uniform price of 1s. each.

Abstracts Published

291,866. **Extracting sugar.** CAPPS, A. W. F., Dudley House, Gaywood, King's Lynn, Norfolk.

A preliminary treatment of freshly cut beet cossets before drying them for subsequent extraction consists in one of the following processes: Passing the cossets through a hot sugar solution usually containing a low grade sugar, or, spraying the cossets with steam or a gas containing water vapour. The wash liquid in both cases is separately purified in known manner. The cossets may be given a preparatory heating before entering the drying apparatus. According to the Provisional Specification cold water can be used. See also Specification, 293,066.

292,582. **Sausages.** SOC. ANON. LA CELLOPHANE, 57, Avenue Percier, Paris.

A casing for sausages and the like is made from a sheet of regenerated cellulose which is formed into a tube by autogenous welding along two overlapping edges. The autogenous welding is effected by treating the said edges with a solvent—*e.g.*, concentrated chloride of zinc—and then pressing the edges together—*e.g.*, by winding the flattened tube on a mandrel. After welding, the solution is removed—*e.g.*, by washing with water. The casing may be made continuously by passing a strip of cellulose, from a bobbin, between guide members which fold it over. Previous to the two edges meeting, one of them is treated with the solvent.

292,654. **Coating bakers' goods.** SNELL, L., 59, Mere Road, Blackpool.

Biscuits and the like are coated with plastic material, such as cream, by depositing a number of individual pieces of cream on a conveyer and dropping a biscuit on each piece whilst it is still on the conveyer. Pieces of cream are deposited, on a conveyer, from a hopper by a reciprocating slide and a rising and falling member in known manner. The biscuits are dropped from a magazine, being released one at a time by a reciprocating slide. A cooler sets the cream prior to the passage around a pulley. The coated biscuit is then detached from the conveyer by a stop, and falls in inverted position on to another conveyer. After the cream is heated by a heater, a cover biscuit is applied. The sandwich biscuit is then conveyed away for storage or package.

292,926. **Food preparations.** BRITISH THOMSON-HOUSTON CO., LTD., Crown House, Aldwych, London (assignees of KNUDSON, A., 150, Benson Street, Albany, New York, U.S.A.)

Conditioning food; vitamins, radiations, treating substances with; food for animals.—Food materials are treated with high velocity electrons—*e.g.*, from a high voltage cathode ray tube, to obtain or increase anti-rachitic properties. The materials used include breakfast foods, flour, cereals, yeasts, starch, cholesterol, olive, cottonseed and other oils, and cattle, chicken, and other animal foods. An example of the treatment of cholesterol is described.

293,255. **Treating oils, fats, etc., with radiations.** KELLY, T. D., 30, Bridle Lane, London.

Oils, fats, or emulsions for food or for external use are treated with beta rays and also with ultra rays to produce vitamins or enzymes. Preferably 5 per cent. or more of protein or amyloid products is added to the substances to be treated.

293,539. **Vinegar.** FOX, H., 54, York Road, New Cut, Bristol.

Apparatus for the acetification of vinegar comprises a vat through which the liquor is pumped by way of a rotatable vessel provided with double-coned nozzles on pipes of different length. The nozzles are arranged so that a uniform spray of liquor falls over the birch layer. The circulating pipe is bent to prevent a backward flow of alcoholic vapours which are condensed and returned to the vat by gravity from the condenser.

293,718. **Chocolate.** SCHREIBER PRODUCTS CORPORATION, 662, Fillmore Avenue, Buffalo, New York, U.S.A.

In the manufacture of chocolate or chocolate-coated food products, melting of the chocolate and the floating of the contained cocoa butter to the surface are prevented or retarded by the incorporation in the chocolate of malt extract powder. Ten parts of the powder may be added to 60 parts of chocolate, 150-200 parts of sugar, and 88-110 parts of cocoa butter; or powder in quantity equal to about 3 per cent. of the weight of the entire chocolate mass may be used.

293,735. **Food preparations; preserving food.** FEENY, V. F., 73A, Queen Victoria Street, London.

A protected vitamin-containing foodstuff is produced by preparing an oil-soaked or oil-impregnated foodstuff in granular form and thereafter applying to the granules a coating which excludes air from them individually, the coating being distinct from the foodstuff proper. A granular vegetable substance, for example, dried yeast, rich in vitamin B may be mixed with 10 per cent. by weight of cod-liver oil rich in Vitamin A and then a small quantity of an aqueous solution of Karaya gum be thoroughly incorporated with the granular mixture and the mass allowed to dry slowly. Other soluble and edible gums and resins may be used to provide the air-excluding coating.

293,752. **Cake and pudding mixtures.** FANCETT, T., 650, Admirals Road, Esquimalt, British Columbia, Canada.

The ingredients of a cake or pudding are put up in desiccated form in one or more air-tight packages, so that the proper consistency ready for cooking is obtained merely by the addition of water. The materials may be divided into two groups—one containing the ingredients which enter into all cake, etc., mixtures—for example, ground rice, desiccated whole milk, pulverised evaporated egg, cream of tartar, bicarbonate of soda, and flavouring essence; and the other group including the bulk materials and those which give character to the particular cake, etc., produced—for example, shortening, fruit, nuts, seeds, etc., together with sweetening and flour; and any one of a range of mixtures of the second group may be associated with a mixture of the first group.

293,794. **Preserving eggs.** MICHAUD, M. D. C., 24, Rue Davioud, and COMPAGNIE OLIVIER, 98, Rue de la Victoire, both in Paris.

Yolks or white or mixed yolks and white of eggs are preserved by addition of sodium chloride or cane sugar, or both, with or without lactic acid, the product being partially evaporated—*e.g.*, until the water content is reduced to 10-30 per cent. by weight. The product may then be hermetically sealed in tins in an atmosphere of nitrogen or carbon dioxide, or a mixture thereof. The whole eggs are examined and next washed successively in a bleaching solution, a sodium bisulphate solution, and in distilled water. The eggs are broken, the yolks and whites being separated if desired, and the preservative in powdered form is incorporated therewith in an emulsifier or other mixer. The proportion of salt used is between 4-17 per cent. by weight, of sugar between 15-50 per cent., and of lactic acid between 0·2-1 per cent. The evaporation is carried out under vacuum and so that the evaporative and heating surface of the material is large relative to its volume. The water content is preferably reduced to 15-25 per cent. by weight. Chemical or alimentary equivalent substances may replace the sodium chloride, cane sugar, and lactic acid.

293,809. **Preserving food.** PUTLITZ, GUNTHER, FREIHERR, ZU, 21, Berkaerstrasse, Weimar, Germany.

In packing fruit, meat, etc., in glass containers in a sterile manner with the aid of steam, which is introduced through a nozzle having an outlet, a trap for condensed water is provided between the nozzle and a steam generator. The trap has an insulated handle with a protecting partition and is connected by a flexible tube with the generator so that by raising the trap the water can be run into the generator.

294,003. **Beverages.** HORIX, C., 2,100, Lincoln Park West, Chicago, U.S.A.

Materials for making beverages.—A beverage is prepared by steeping Maté leaves in water to form an infusion which is filtered and cooled and passed through a vacuum chamber to extract the air. The infusion is then carbonated and bottled with or without the addition of a flavouring syrup.

294,209. **Vinegar; yeast.** BOUTTEAUX, M. J. J., 16, Avenue des Conferences, Suresnes, France.

Vinegar is obtained by the oxidation of the wort which is separated from the beer yeast discharged from the fermenting vats. The wort may be sterilised, and alcohol, obtained by the distillation of a part of the wort itself, is optionally added. The yeast is strained, washed, bleached with ammonium carbonate, and decanted to remove the sound cells, which are then dried.

Recent Trade Marks

This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal," and is published by permission of the Controller of H.M. Stationery Office.

RAYMAL

491,194. **Bread and flour.** W. J. BROOKES AND SONS, LIMITED, Brookes Bakery, Skerton Road, Old Trafford, Manchester. August, 29.

SUNKREEM

488,923. **Butter.** BURGESS' DAIRY, LIMITED, 32, 44, 46, 48, and 52, Gartside Street, Manchester. August 29.

UNA

492,425. **Tea.** THE PORTSMOUTH GROCERS' NO. 1 BUYING CENTRE, LIMITED, 24, Canal Walk, Somers Road Bridge, Portsmouth. August 29.

LITTLE ROLAND

493,264. **Biscuits.** FORTNUM AND MASON, LIMITED, 181, Piccadilly, London, W.1. August 29.